Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

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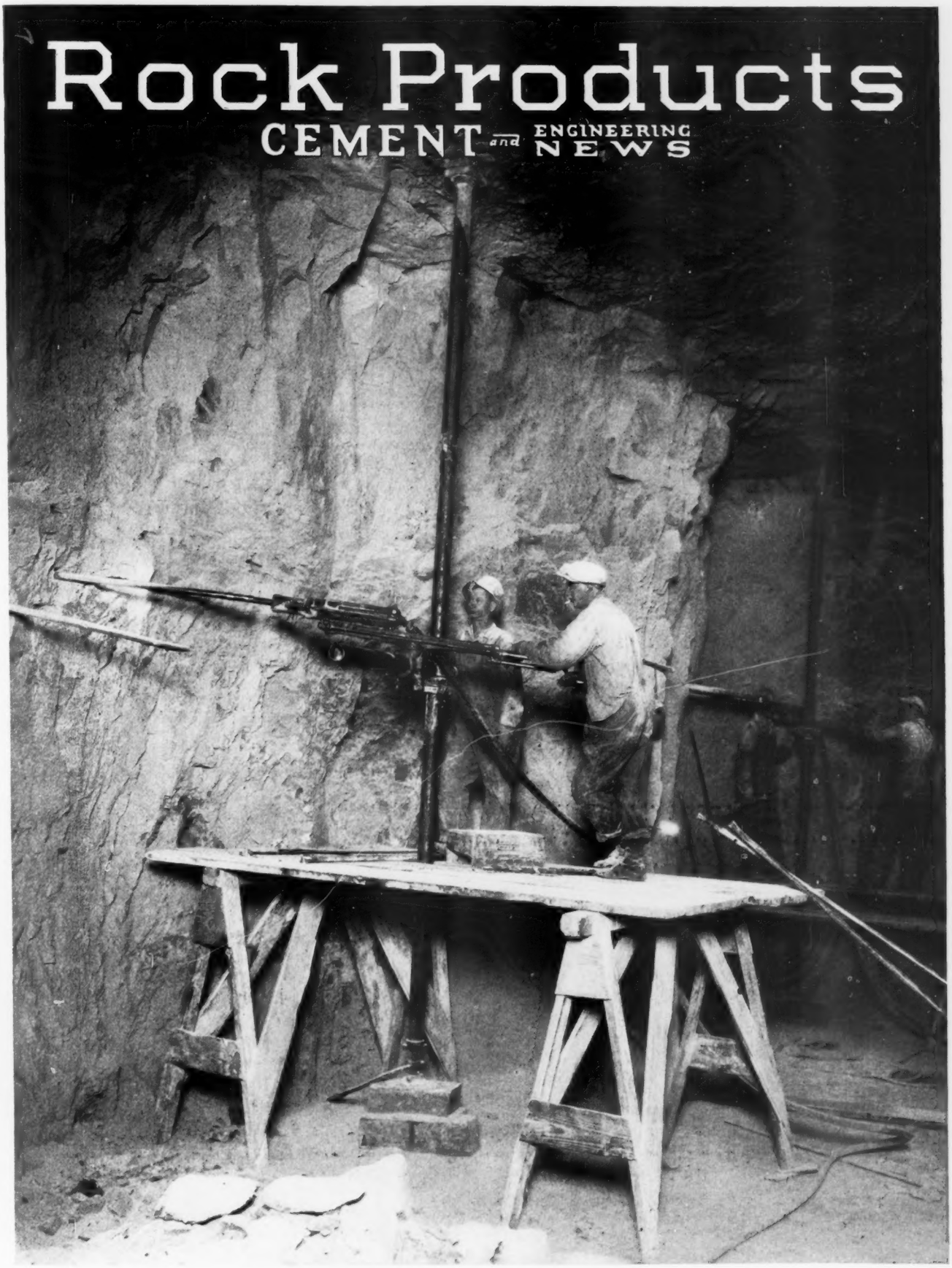


Limestone mining at Valmeyer, Ill., by the Columbia Quarry Co.

Loading limestone with electric shovel at Valmeyer, Ill.

Another view in the mine of the Columbia Quarry Co.

Valmeyer Operations of the Columbia Quarry Company

Mine and Plant Producing Limestone for Metallurgical and Chemical Use

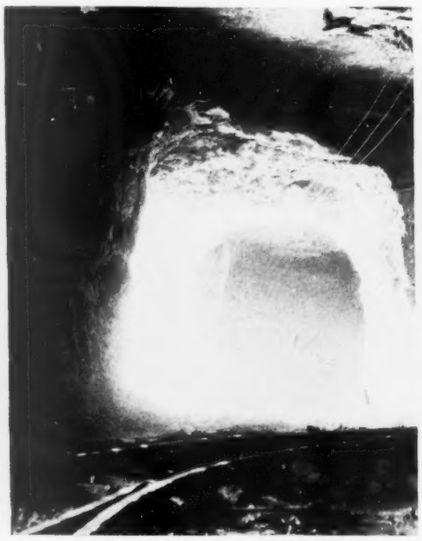
THE COLUMBIA QUARRY CO., St. Louis, Mo., has as its main crushed limestone operation a plant at Krause, Ill., which is about two miles north of Columbia, Ill. This operation is probably better known to the industry than the smaller, but very interesting, operation at Valmeyer, Ill., which, however, has a total production of 300,000 tons per year. Valmeyer is a small farming town some 17 miles south, and a little west, of Columbia, and 26 miles due south of East St. Louis, Ill. It is back from the east shore line of the Mississippi river a distance of three miles. The plant is just at the eastern edge of town.

All rock shipments are handled by the Missouri Pacific railroad. At present very little trucking business is done from this plant, although wagon bins will be constructed and trucks secured to make delivery of agstone to the farmers' fields.

The production of the plant is for metallurgical stone for blast furnaces, for use in the concentration and refining of aluminum ores, a small percentage for basic open-hearth steel furnaces, and the balance is sold for agricultural limestone. About 55% of the production is for blast-furnace metallurgical stone, 25% for use in the treatment of aluminum ore at East St. Louis, and the balance is about evenly divided between open-hearth steel-furnace stone and "agstone."

The Illinois Geological Survey calls this

The entrance to the mine is at base of old quarry



Interior view will give an idea of the size of rooms

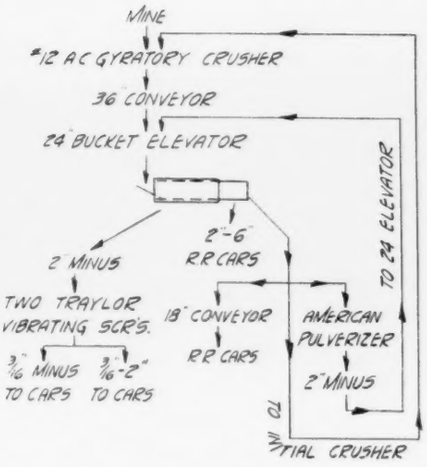
Dumping limerock to crusher by means of air hoist

stone the Kimmswick limestone and it belongs to the lowest or oldest in the Ordivician system. Locally the stone is referred to as the Mississippi limestone of Monroe county. It is a considerably older deposit than the Ste. Genevieve limestone on the opposite side of the river. The rock is a coarsely crystalline, brown-colored stone, very soft and not suitable for road work for that reason. It is of interest to note that out of 100 carlot samples the silica content of the limestone was less than 1/10 of 1%. The stone has the following analysis: $CaCO_3$, 96%; $MgCO_3$, 3%; Al_2O_3 and Fe_2O_3, 0.5%; SiO_2, 0.10%.

The face of the deposit, in the old open quarry, appears to be massive, with few horizontal or vertical seams, but in the recently mined areas are found many horizontal bedding planes and vertical cracks.

The Mine

These vertical fissures account for a large percentage of drilling troubles, stuck steel, etc., as otherwise the rock, being so soft, drills very readily. The fissures also give the roof the appearance of not being safe although care is exercised in keeping the loose rock barred down and well arched in these fissured zones.



Flow sheet of mill producing metallurgical stone

in two open quarries that attacked the stone at two different exposures. The first of these to be opened soon developed such a heavy overburden that mining had to be resorted to. This exposure of stone is about 100 yd. from the screening and crushing plant. The second quarry opening is over the hill from the first opening, and has been abandoned also, on account of the heavy overburden. The mine supplies all the rock for present needs.

operation. The rooms thus started are widened to a minimum of 40 ft. by drilling into the side walls in such a fashion that when they are shot the rock is removed in slabs. This is continued until the pillars are roughly 25 ft. in diameter. The size of the rooms and pillars depend on local conditions, as there are several rooms 75 ft. wide. As can be seen from the mine map, there is a certain regularity as to the location of these pillars. Mining operations are at present all confined to the north section of the mine. The noteworthy feature of this is that the mine has been developed to this size in less than a year.

The height of the headings is kept at 20 ft. as this is ample headroom for the loader. In most of the rooms the backs are arched slightly, but in several places the roof was perfectly flat, due to the horizontal bedding plane and had several vertical cracks. P. G. Foreman, superintendent, advises that this condition is not to his liking, as there is danger of some of the rock slabbing and falling. When these areas assume any size a pillar is left, or they are shot down until the back is suitably arched. So far, however, there have been no accidents in the mine from any cause.

The Kimmswick limestone has a thickness

Plan showing mined portions and pillars left for supporting roof

The company owns about 1000 acres adjacent to the plant, and all but 120 acres are limestone bearing; however, owing to the rolling and otherwise cut-up nature of the surface this acreage is reduced to about 600 that can be economically worked.

The deposit starting at the surface consists of from 20 to 50 ft. of loess earth, then 50 to 55 ft. of the Kimmswick limestone, under which is 10 ft. of a flinty limestone. This bottom stone is full of large chunks of cherty material. In mining, the floor of the mine is kept about 12 in. above the top of this siliceous material to be on the safe side.

The early operations of the company were

The deposit being mined is an anticline, the axis of which runs N.W. by S.E., and it is about ¾ mile through the deposit at right angles to the anticline. The floor of the mine slopes about 8 deg. in favor of the loads.

Method of Mining

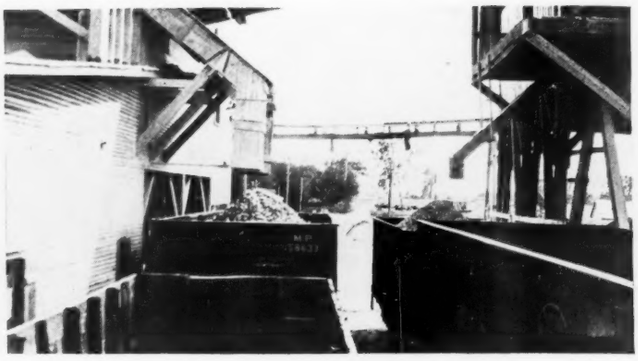
Mining is conducted on the "room and pillar" system. Several V-shaped headings are driven into the breast at regular intervals, of sufficient width for power shovel

of 50 to 55 ft., and when the entire area now owned has been stoped out to a height of 20 ft. the roof will be shot down, probably starting from the face workings and retreating toward the tunnel entrance.

The stone drills very easily, in fact an ordinary chisel type drill cannot be used on account of the tendency to "rifle" in the hole, sticking the drill steel. The "E" type bit has been found to be the only one that will not rifle in this rock.

Drilling is done by three Gardner-Denver rock drills, No. 7, mounted on 18-ft. columns with 3-ft. arms. Air is supplied by a Sullivan W.N. 31 angle compound com-

Valmeyer plant of Columbia Quarry Co.



Cars are loaded direct from screens

pressor delivering 875 cu. ft. of air per min. This compressor is driven by a 150-h.p. direct-connected, synchronous General Electric motor, running at 257 r.p.m. The compressors are equipped with Sullivan automatic unloaders; compression being carried at 20 to 30 lb. on the low side and 110 lb. on the high, at which pressure it is delivered through a 4-in. line to the 3x6-ft. receiver located at the entrance to the mine. Two-inch feeder lines supply the mine. The compressor is housed in a 32x40-ft. corrugated-iron building near the screening plant.

As an auxiliary there is an Ingersoll-Rand compressor, Type 10, capable of supplying 450 cu. ft. of air per min. This compressor is belt-driven by a 100-h.p. Allis-Chalmers induction motor. Each drill requires about 210 cu. ft. of air per minute, although it is seldom that all three drills are running at the same time.

The holes are drilled with 1¼ in., round, hollow steel, making dry holes, usually to a depth of 20 ft., and are bottomed at 1⅜ in. About 225 ft. of hole per 10 hours, including setting up the 18-ft column, is considered an average day's work.

The holes are loaded with 40% gelatin at the bottom, and 25% for a top load. The amount of each used is about in the same ratio, i.e., 40-60. Electric exploders, No. 6, are used. No large number of shots are fired at one time, as it is more desirable to slab off the layers of rock at successive intervals until the room is filled with broken stone. Very little block holing is necessary for loading, although at the crusher shooting is sometimes resorted to.

About 1½ tons of rock per foot of drill hole is obtained and 1⅜ tons of rock per pound of explosive. Grasselli powder 1¼"8 in.) is used.

Loading

Loading is done by a 1½ yd. special Bucyrus electric shovel, full caterpillar, and with a 14-ft. boom and 10-ft. stick. When possible the shovel is spotted in the center of the advancing muck pile, and a track is laid on each side, so that loading can be continued while the rock train is making a round trip. Two flood lights on the Bucyrus loader and two ordinary 100-watt lamps supply plenty of light for the loading operation. The rock is just damp enough to make no dust in the stopes or at the loading point.

The rock is ideal size for loading with this type of shovel, and what was especially noticeable was the ease with which the rock "ran" toward the shovel, not hanging up in steep banks.

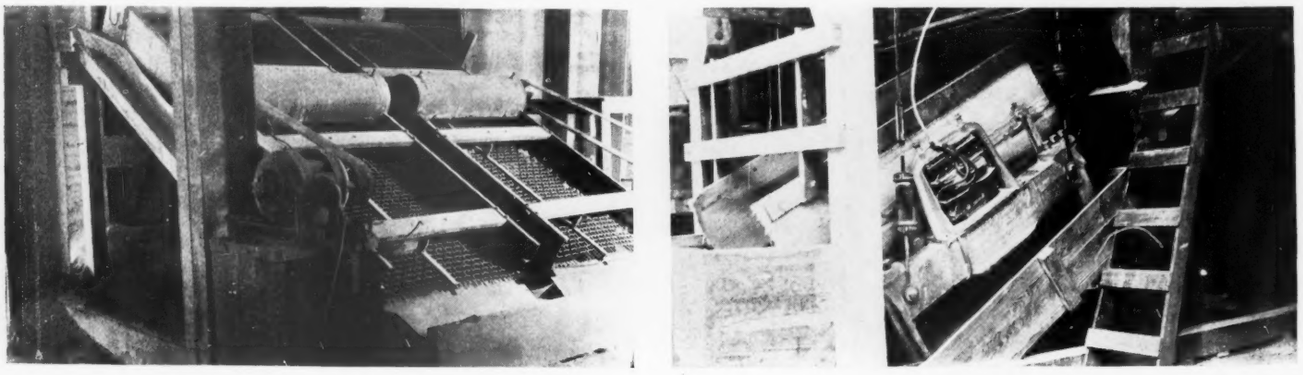
One man and a ground helper operate the shovel and load the entire production of the plant, which has a capacity of 1000 to 1200 tons per day. As the backs are to be shot down at some future date, the floor is not cleaned up as thoroughly as in most quarry operations. About 900 to 1000 tons of rock are secured from each room or heading.

The ore is loaded into 6½-ton capacity cars, side-dump, with Koppel trucks, but the body was made by the Columbia Quarry Co.'s own shop force. They have 10 of these cars. Haulage is over 36-in. gage track, with 56-lb. rails and wood ties. The cars are assembled by two 8-ton Plymouth gasoline locomotives, with an 18-ton Plymouth for main line work.

It would appear that with gasoline driven locomotives in the mine that there would be a ventilation problem to contend with, but this is not the case, as will be seen by referring to the mine map. At a point opposite the tunnel entrance the heading broke through to the surface, this with the height of the heading forms a natural draft that provides ample ventilation. At the time of the inspection, blasting was being done in an adjoining room and there was no inconvenience to anyone, the powder men and miners returning to the scene of the blasting in a few minutes after each series of shots. Here might be mentioned that the temperature outside was extremely hot and humid, while in the mine all the headings were cool and comfortable; no doubt some of the reduction in cost of mining as compared to quarrying can be traced to this ideal working condition. The mine alone employs about 20 men, with Charles Asselmeier in charge as mine foreman. All the employes in the mine and plant are white.

It used to be necessary to wash the stone, but since going underground the rock has been so clean that this has become unnecessary.

The mine has been in operation about a year, and so far, with development head-



Vibrating screens make all the final separations at the Valmeyer plant of Columbia Quarry Co.

ings, there is about one mile of track in use. At present all the drill steel is sharpened by hand, but the company is installing an Ingersoll-Rand sharpener for this work.

The method of warning when shooting is to start is by means of a whistle. This serves to warn the men that shooting will start in a particular heading. As the successive shots are exploded no additional warning is given, it being understood that no one is to enter these headings outside of the man in charge of the blasting.

Crushing and Screening Plant

The rock is dumped by an air-hoist somewhat on the same order at the Krause, Ill., operations, the cars being of the same design. At the Valmeyer plant, however, only one car can be dumped at a time. The rock train passes directly over and dumps into a No. 12 Allis-Chalmers gyratory with corrugated head and chilled steel concaves. The crusher is set to discharge a 5-in. product.

The material after passing through the initial crusher drops to a 36-in,. 6-ply, rubber-belt conveyor, which elevates the rock slightly and drops it to a bucket elevator of about 50-ft. centers. The elevator belt is of 8-ply, rubber, lap-spliced, and is equipped with 24x12-in. buckets. The head pulley has a diameter of 36 in. and the tail pulley 30 in.

The rock is discharged from the elevator to a 60 in. by 20 ft. Gruendler revolving screen, the upper section having 12 ft. or 2 in. diameter, punched holes and 6 ft. of 6 in. diameter openings.

The oversize from this screen passes to a 24-in., 6-ply, belt conveyor, and from the discharge end of this conveyor the rock can be sent direct to standard-gage gondolas for shipment to steel plants for basic-open hearth stone, or the oversize can pass to an American pulverizer for reduction to minus 2 in., in which event the discharge material is sent back to the 24-in. bucket elevator that serves the primary crusher. The third path that the oversize can follow is to be sent back to the primary crusher and broken to minus 6 in.

The 2x6-in. material from the revolving screen is sent direct to cars for blast furnace work in St. Louis. The minus 2 in. material is conveyed to what used to be the washing plant (washing was found unnecessary with the mined stone) by means of an 18-in. cross conveyor to two 3x4-ft. Traylor vibrating screens, where two products are made. The finer (minus 3/16 in.) passes to cars or to storage for agricultural limestone. The 3/16 in. to 2 in. falls direct to cars for shipment to the aluminum plants for calcining in their rotary kilns.

A 2-h.p. motor generator set supplies the direct current for both the screens, which are equipped with magnetic coils on the sides and vibrate the cloth 3600 vibrations per minute.

The company is installing a 48 in. by 14 ft. hexagonal screen to make another separation for rotary lime burning purposes. This screen will give an additional 7/8-in. by 2-in. and a minus 7/8-in. product.

No Bins for Chemical Stone

One feature of the plant that perhaps is unusual, for an operation supplying chemical stone only, is that there are no bins, the products in all cases falling to four different cars spotted on the tracks between the crusher building and the old washing plant. For moving the cars under the loading chutes a Mundy, 2-drum, hoisting engine is used for car puller with a 3/4-in. steel cable.

Most of the machinery in the plant is driven from a line shaft, which is connected to a 150-h.p. Allis-Chalmers, slip-ring, induction motor by means of a Texrope drive. All of the transmission belting is of balata, supplied by the Cappen Belt and Rubber Co. of St. Louis.

Block-Holing at Crusher

As very little block holing is done in the mine, it is often necessary to do this at the crusher, in which case the stone is drilled with an Ingersoll-Rand jackhammer and broken with a small charge of dynamite.

The company has a small shop for repair work, which is equipped with a 5-h.p. Allis-Chalmers motor driving a drill press, emery wheel and a forge supplied with air by a hand-operated Keen Cutter blower.

The plant used to be run by a steam plant which has been dismantled. The present plant, including compressors, uses a total of 510-h.p. It requires 35 men for operation of the mine and plant.

As the track to the mine from the plant has an 8% grade, it is necessary to have dry sand for the locomotives. This is supplied by a No. 2 Handlan sand drier.

The executive offices of the Columbia Quarry Co. are at 1612 Syndicate Trust building, St. Louis, Mo. E. J. Krause is president; C. H. Krause, vice-president, and H. F. Schmidt, secretary and treasurer. The operating staff at Valmeyer are: P. G. Foreman, superintendent; Charles Asselmeier, mine foreman; T. S. Cheney, in charge of the plant office.

Left to right: P. G. Foreman, T. S. Cheney and Charles Asselmeier, staff at Columbia Quarry, Valmeyer, Ill.

Increased Imports of Crude Mica in First Half of 1928

IMPORTS OF CRUDE MICA into the United States during the first half of 1928 showed an increase of 6.3% in quantity over those for the corresponding period of 1927, accompanied by a decrease of 26% in valuation, according to the Minerals Division, Department of Commerce. While the decline in average value of imports has been general for all classifications of crude mica, the greatest decrease occurred in mica splittings.

The statement made public recently follows in full text:

During the first six months of 1928 this country imported 245,875 lb. of unmanufactured mica, valued at $121,016, as compared with 366,183 lb., valued at $243,152, in the like period of 1927, while imports of mica splittings were 1,525,950 lb., valued at $452,428, as compared to 1,300,937 lb., valued at $530,325, in 1927.

India predominates as a source of unmanufactured mica of higher valuation, which is composed principally of uncut and untrimmed sheet mica, having supplied 37% of the total during the first half of the present year. Combined imports of 47,174 lb. from France and Madagascar constitute 20% of the total and may properly be credited to Madagascar as the original source. There follow 16% from Canada, 11% from Argentina, 8% from Brazil and 3% from Guatemala. Receipts of this type of mica from the other countries shown are probably composed mainly of re-exports.

India is likewise the outstanding source of mica splittings, having furnished 69% of the total during the first six months of 1928. Combined imports of 255,498 lb. from France and Madagascar represent 17% of the total, and all of this probably originated in Madagascar. Imports from the United Kingdom amounted to 11% and represent re-exports, principally from British possessions. Canada supplied 3%, which was practically all of the remainder of the mica splittings imported into the United States.

Plant of Nickel Plate Sand and Gravel Co., Fairview, Penn.

An Unusual Sand and Gravel Plant With All Kinks First Ironed Out on Working Model

Description of Nickel Plate Sand and Gravel Company's Plant at Fairview, Penn.

By L. E. Redding, Superintendent

OUTSTANDING AMONG the various sand and gravel plants, and undoubtedly one of the most unique, is the plant of the Nickel Plate Sand and Gravel Co., located at Fairview, Erie County, Pennsylvania, a small town about 15 miles west of Erie, Penn., and on the Nickel Plate railroad.

Situated nearly midway between the New York state boundary line and the Ohio line, the material produced is shipped throughout eastern Ohio, western Pennsylvania and western New York states.

This company started operations at the present location in the late season of 1915, leasing an old abandoned pit formerly operated by the Nickel Plate railroad for fills and unwashed ballast.

Pit Operation and Early Plants

The bank has a face of 35 ft. to 40 ft. above water, with a variable depth of from 15 ft. to 35 ft. below water, with materials grading about 50-50 sand and gravel on an average, as one side of the pit will run 80% sand and 20% gravel, while the opposite side runs vice versa. Being a glacial deposit, the gravel runs in the form of boulders ranging in size from approximately 8-in. down, with the greatest amount of pebbles below 2-in.

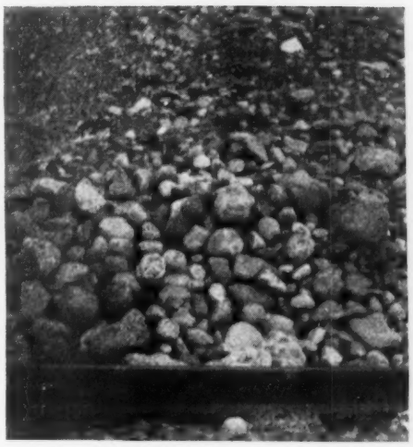
The first plant, built in 1915, was of the skeleton type, loading direct to railroad cars, and was designed and equipment furnished by the Raymond W. Dull Co. It was equipped with bucket elevator, preliminary scrubber and three conical screens, together with the Dull conical sand dewatering device. This plant was steam driven and had a rated capacity of 500 tons per 10-hour day, although it did much better. In January, 1919, this plant was burned, necessitating building a new plant for the coming season.

Winter stripping of fine sand and clay which is later sold for railroad fill

Railroad hopper for fine sand

Work was started immediately and a plant of similar design was erected, using one large preliminary scrubber, with divided discharge, feeding two rows of screens, three in each row. Conical dewatering tanks were again installed and electricity used for power.

During the season of 1925 this plant was



Portions of the bank run high in gravel

found to be inadequate for the growing demand for material from this company, and a larger, more modern plant was decided upon; and the present plant was erected during the winter of 1926.

The plant was designed and erection supervised by the writer, and, although of practically the same type as the two older plants, is much more compact and substantial.

In designing and erecting this plant no pains were spared in either plans or machinery, as a small model on an exact scale of 1 in.=1 ft. was made; even wooden screens, scrubber, etc., were turned out to scale; and this model was worked over until all the "bugs" were ironed out before any work was started on the plant itself. As a reward, no trouble whatever was experienced in either the plant erection or machinery installation, and the result was an exceptionally well-balanced and extremely flexible plant arranged to produce the aggregates to satisfy the consumer.

The plant proper is 22 ft. wide and 85 ft. long, the highest point or peak of the roof being 50 ft. above the rails under the plant. Reinforced-concrete abutments with a clear height of 14 ft. above the rails were used, the same construction being used in the receiving hoppers, of which there are two. Material from the bank is excavated by a Marion, type 7, steam shovel and loaded in 8-yd. Western, bottom-dump cars.

Handling the Raw Material

These cars have a bar grizzly across the top to reduce the shock of material when dumped from the shovel bucket, also to prevent any exceptionally large boulders being dropped inside the car.

These cars are in turn drawn to the gravel receiving hopper by two 20-ton locomotives, one an American, one a Lima. Here the cars

This portion of the bank runs about half-and-half sand and gravel

are dumped on a bar-and-spacer grate with 9x9-in. openings, which allow the fines to pass through, holding any oversize boulders on the grate, which is heavily enough constructed to allow these to be broken with a sledge until they pass.

Specially Designed Feeder

There is so little oversize that one man at the hopper takes care of the dumping and also breaks these boulders. This receiving hopper is 14x14 ft., with a capacity of 24 cu. yd. From the hopper the material is fed to the inclined conveyor belt by means of an endless belt feeder consisting of two 24x32-in. pulleys, 8 ft. c. to c., the loaded belt being supported by six regular return rolls, such as are used on nearly all belt conveyors, and spaced 16 in. apart. The belt speed is 140 ft. per minute.

This feeder was designed and built up at the company's own shop, using I-beam construction, bolted and riveted throughout. The feeder is driven through back-gearing by a 5-hp. motor, using magnetic control, allowing the dumper man, the first floor man, or the man in the screening department either to start or stop the feeder.

Regular flow of material to conveyor belt is maintained by means of a steel gate hinged at the top, with a tangent bar riveted a little above the center. This bar is about 2 ft. long and carries a 40-lb. weight, and as any large stones are carried forward on the feeder belt, the added pressure on the plate raises this weight, allowing the stone to pass through, after which the weight immediately closes the gate and the normal feed is resumed.

The inclined conveyor belt to the top of the plant is 24-in., 6-ply Goodyear with ⅛-in. rubber covering on the carrying side, 1/16-in. rubber on the pulley side, running on a 19 deg. 40 min. angle from the horizontal, and is 127-ft. centers, with a belt speed of 200 ft. per min., using a 20-hp. motor as power.

All troughing and return rolls are made by the Dodge Manufacturing Co. (roller-bearing type), the troughing rolls being the three-pulley type.

Tension on this belt is maintained by a gravity take-up placed near the lower end, where it is always accessible.

Crushing and Screening

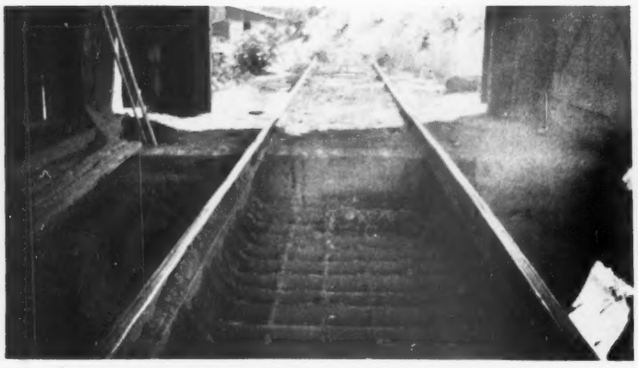
Material discharges from this belt to a Telsmith No. 360 rotary grizzly with bars spaced 2¾ in., the oversize going to one No. 8 and one No. 3 Telsmith crushers; the fines passing through the grizzly drop directly to a divided wash box, where the bank material receives the first water, a 3-in. stream being thrown on the material here on each side of the division plate. This plate divides the material equally between two

Crane loading fine sand to dump car

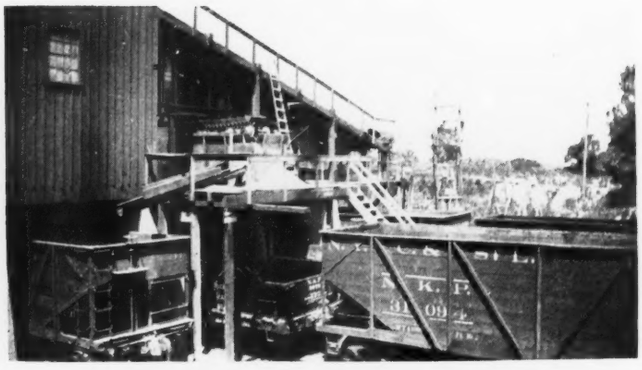
Bottom dump cars built by the company hold 9 cu. yd.

Locomotive and cars at shovel

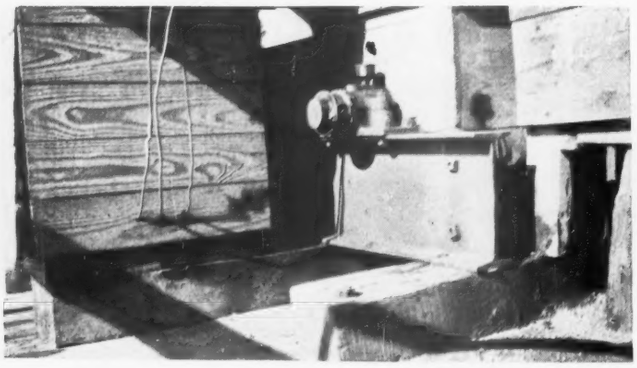
Crane excavating fine sand



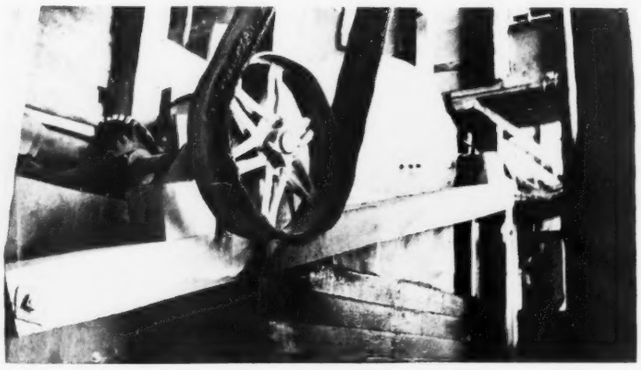
Track grizzly above the gravel hoppers. The rails are supported on 18-in. steel beams



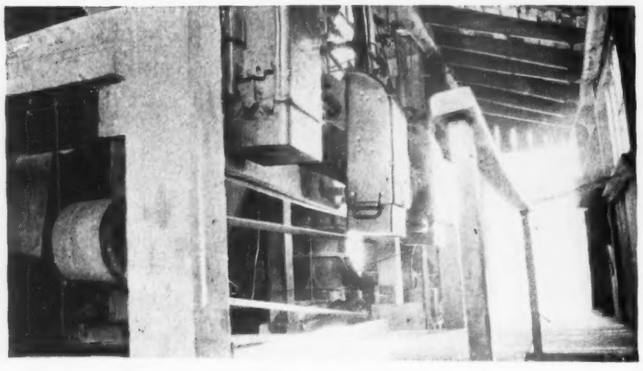
Upper side of plant over loading tracks showing the discharge end of the sand rewasher



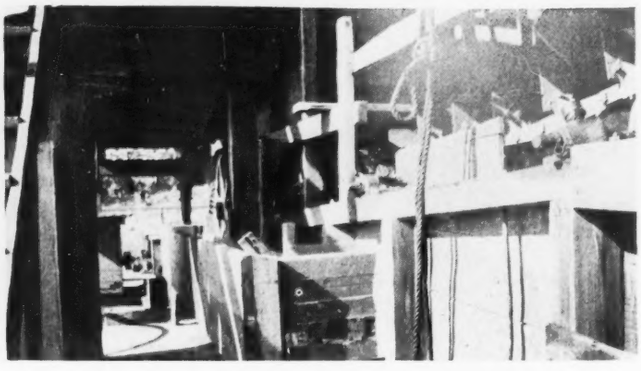
Partial view of back gearing which was built up in the company's own shop



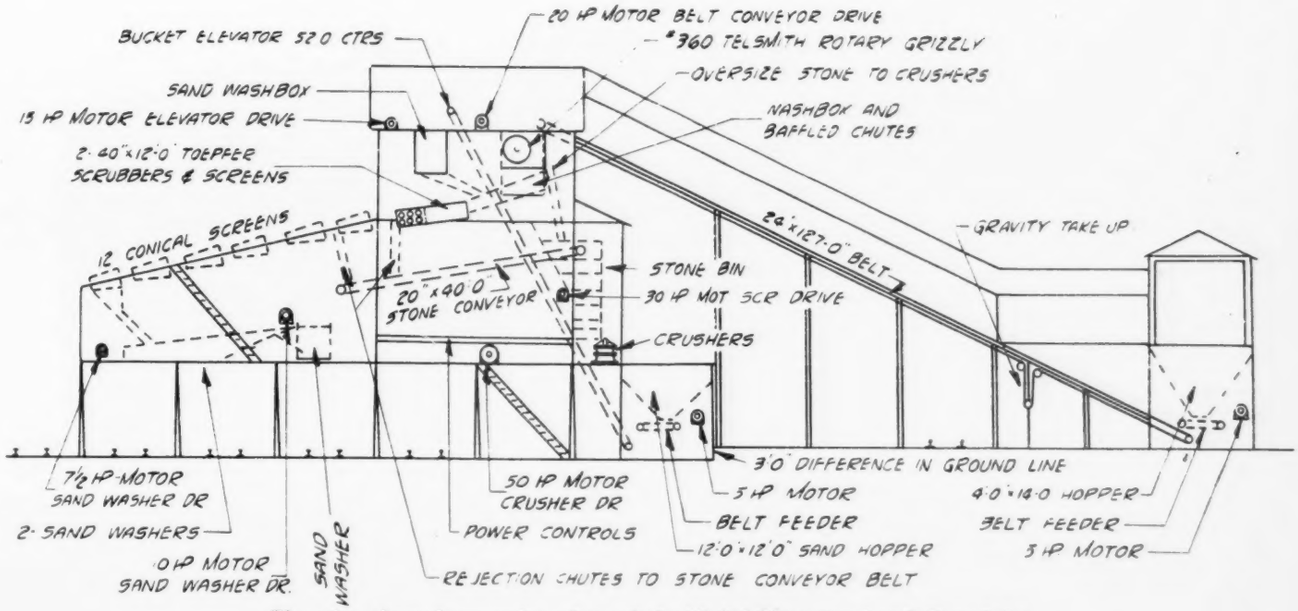
Auxiliary screen on first floor for extra rinsing of gravel



Electric controls with crushers and driving motor



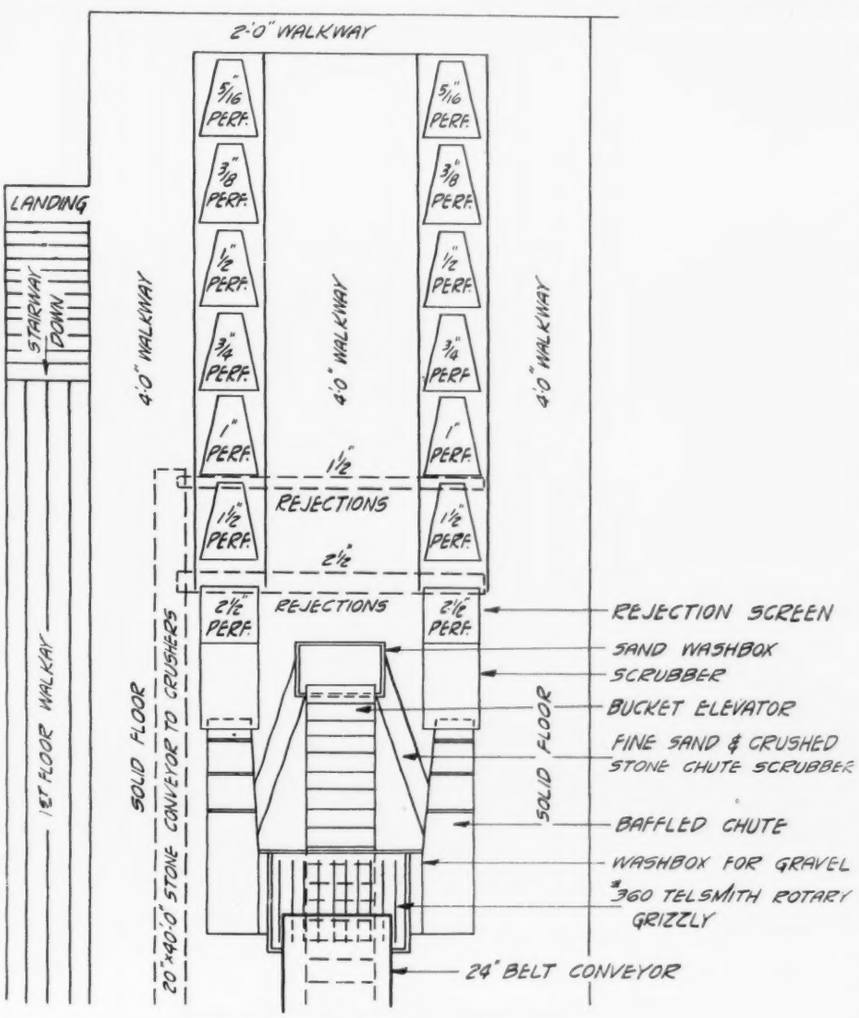
One of the sand washers placed directly under the screens



Elevation through screening plant of the Nickel Plate Sand and Gravel Co.

baffled chutes to two Toepfer combination scrubber and rejection screens.

These scrubbers and screens are 40 in. by 12 ft., the scrubber sections being 6 ft. and the balance being perforated with 2½-in. holes, which is the maximum size produced at this plant. The rejections from these screens drop directly to a 20-in. by 40-ft. belt conveyor which conveys them to the stone bin, where they again merge with the rejections thrown off by the rotary grizzly and go to the crushers.



Second floor plan showing screen arrangement

Material passing these rejection screens now passes through sluice pans to two rows of Link-Belt conical screens, six in each row, being the 72 x 54 x 27-in. size. These screens run in pairs and are perforated for sizes 1½ in., –1 in., –¾ in., ½ in., –⅜ in. and ⅛ in Sand passing the screens drops directly into two sand wash boxes of the type used in many gravel plants today, comprised of boxes 16 ft. by 42 in. by 42 in. deep, using two chains wtih transverse paddles dragging the sand up an incline, thereby dewatering it.

Sand Washing and Separation

These two boxes discharge the sand into still another box of the same type placed at right angles and directly in front.

Here clear water is added, and the sand rewashed and delivered directly to cars on any one of three tracks under the plant. This box is much larger than the first two, being 32 ft. long, 54 in. wide, and carries about 2 ft. of water. This arrangement produces a very clean grade of sand running 1% or less silt.

Meeting sand specifications in this district is somewhat of a problem, as specifications of Ohio, Pennsylvania and New York state highway departments are all different, and material for all three states is produced at this plant. This led to a means of grading sand mechanically which was worked out when the plant was planned. Sand produced from the bank above water has a very small percentage of fines passing a No. 20 sieve, so no sand passing highway department specifications can be produced from the bank alone, but a very successful method was

worked out to meet any and all specifications. At one end of the pit where the gravel had originally been taken off down to water level, is a deposit of sand running about 85% through a No. 20 sieve.

This deposit is excavated by a type "A" Erie crane using a ½-yd. clamshell bucket and loaded either in railroad cars or 6-yd. Western, bottom-dump cars and hauled to the plant by a 30-ton American locomotive, again passes through the rejection screens.

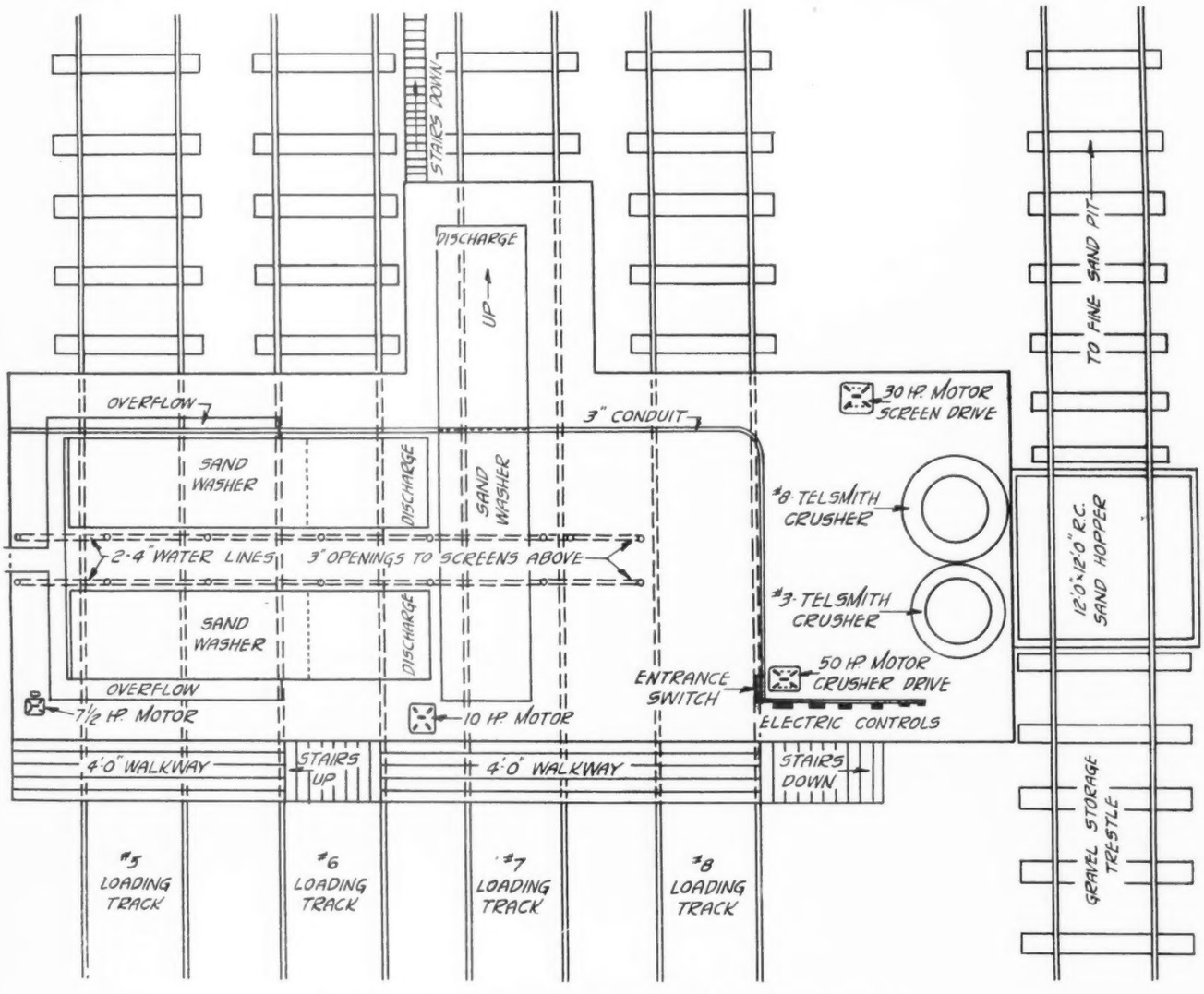
Mixing Various Sizes

Rejections from the two 1½-in. perforated screens may be also returned to the crusher by the same conveyor carrying the 2½-in. rejections, allowing all material to be made 1½-in. Any two or more grades of gravel may be mixed, or both sand and gravel, producing a proportioned aggregate, with any

10-hour day, according to grading of materials.

Track System

The track system used here is very satisfactory, with plenty of trackage for both empties and loads provided. The plant stands about 1200 ft. from the main line of the Nickel Plate railroad, which also has a passing siding at this point, from which the switches leading to the plant are taken. One



First floor plan showing location of crusher and sand washers

where it is dumped into the second reinforced-concrete hopper. This hopper is 12x12 ft., and sand from here is fed by a second belt feeder, similar to but smaller than the gravel feeder, to a bucket elevator of 52-ft. centers, using 10x12x18-in. buckets on a No. 132 chain, using a 15-hp. motor. This elevator discharges into a second wash box dividing the sand, sending one-half to each scrubber, where it mixes with the bank material.

The percentage of fines is regulated by a gate of the same design as the one used on the gravel feeder. Discharge from the crushers also falls into the buckets of this elevator, being mixed with the fine sand, and percentage of sand the consumer requires. Eight different grades of gravel and three of sand are produced. Any two of gravel and two of sand may be produced at one time, as there are four loading tracks. This different grading is accomplished, without stopping the plant, by means of chutes and gates carrying the material to different tracks.

Different grades of sand are made simply by allowing the material passing the ⅜-in. or $\frac{5}{16}$-in., or both, to drop to the sand washers. Washed foundry gravel or coarse sand is produced by not using any fine sand at all.

The plant capacity is 1500 to 2000 tons per track leaving this siding passes the outside line of the plant and extends beyond the plant 600 ft. on a grade of approximately 5% down past the plant.

This track is used as an empty receiving track and accommodates 40 ordinary length cars. All cars needing cleaning are cleaned on this track, from which they are taken by one of the company's locomotives and brought through a ladder track to any one of the four loading tracks, running directly under the plant. These four tracks have a capacity of 34 cars, making a total of about 70 cars. These tracks are on a grade of 1.5% above the plant and 1% below, and

cars placed above the plant are handled by gravity to a point 500 ft. below.

When these four tracks become full of loaded cars and more track is needed, the loads are pushed farther out through another ladder track leading to the outgoing track, from which the railroad company takes all loads.

Although this trackage works very well ordinarily, the railroad company is contemplating two more tracks in the pit, one as an empty track and one as a load track.

Water Supply

As excavation is carried down practically to water level, the water supply for washing is taken from a reservoir, excavated by a clamshell, which is now connected to the area from which fine sand has been excavated, insuring an inexhaustible supply. This is delivered to the plant by two 4-in. belt-driven pumps using a 50-hp. motor. Approximately 1200 gal. per min. are used.

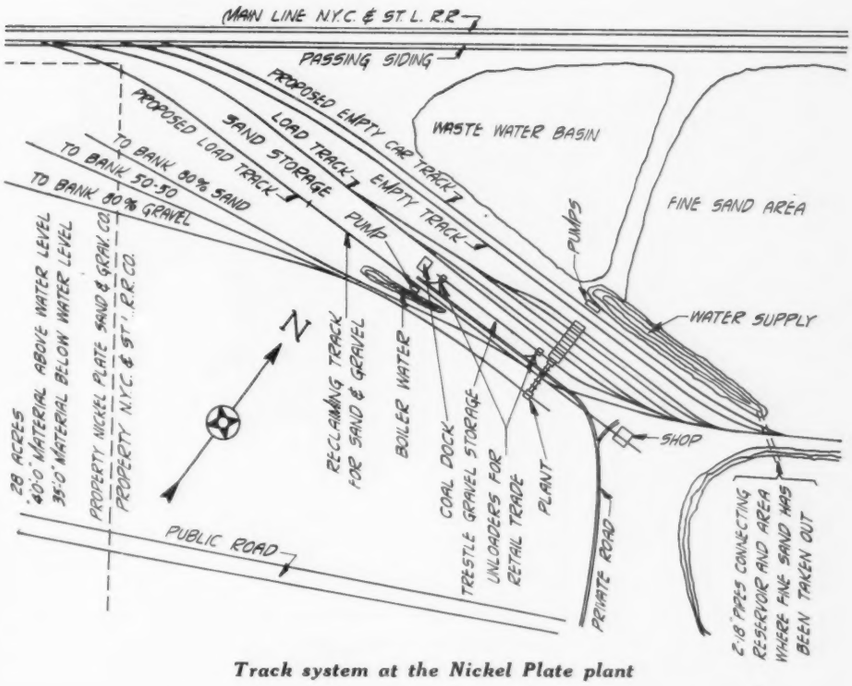
Water for boiler use is pumped from another reservoir to a pressure tank of 1000-gal. capacity, and a pressure of about 50 lb. is maintained by a Gould 6x12-in. piston pump, driven by a 7½-hp. motor.

This water is piped below frost to all points of excavation and also to standpipes for watering locomotives.

Power

Electricity is used throughout the plant for power, purchased from the Northwestern Electric Co. and brought in at 2300 volts to three 75-k. v. a. transformers, where it is transformed to 440 volts and 220 volts.

All motors are manufactured by the Burke Electric Co. and are of the induction type.



Track system at the Nickel Plate plant

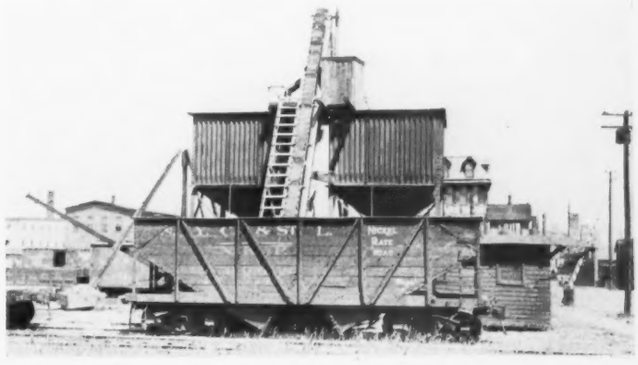
Storage

Although material produced at this plant is shipped nearly as fast as produced, provisions have been made for the storage of 4000 tons of gravel and 10,000 tons of sand.

Sand is stored by clamshell from cars by one of the cranes, while the gravel is stocked through a trestle 20 ft. high and 300 ft. long. This trestle is a continuation of the incline over the fine sand hopper, and is also provided with two small hoppers which take care of the retail trade at the plant.

Cross-dump, hopper cars are used both for storage of gravel and all retail trade.

Side view of distribution bins at Erie, Penn.



The company's bins for distribution in Erie

Loading a truck at the retail hopper is done at one spotting

Nickel Plate Sand and Gravel Co. plant from coal yards

Dinkies pass through the shops and are again ready for service

View showing one end of storage trestle, coal docks and sand storage

Equipment Maintenance

A high point of efficiency is maintained at this plant due to the good condition in which all machinery is kept through the employing of only competent operators on each machine and also in the plant.

Further efficiency is maintained by having a handy and adequate shop at the plant. This shop is constructed so as to allow any machine to be taken inside and given a general overhauling when necessary.

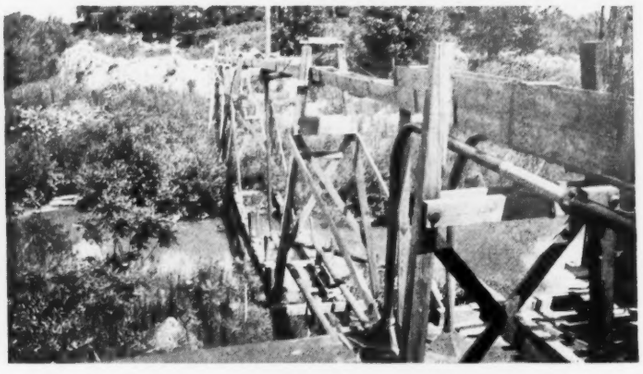
Lathes, drill presses, grinders and all kinds of tools make up the shop equipment. The shop is steam heated and is piped for hot water to be used in cleaning up machines. A reserve of necessary repair parts for each machine is also kept in stock at the shop.

City Distribution of Material

Besides operating the plant, this company also operates a retail yard at Erie, Penn.

Looking up waste water flume of Nickel Plate Sand and Gravel Co. plant

High water occasionally bothers in fine sand operation

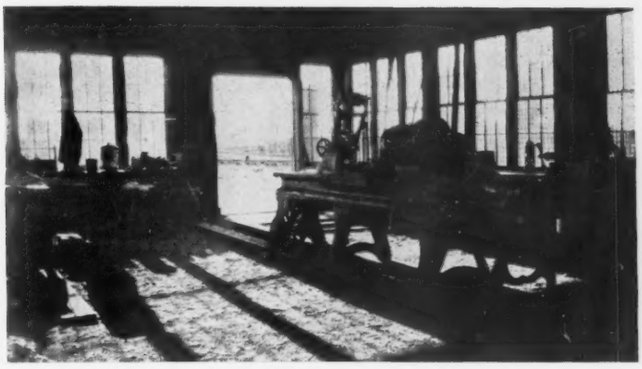


Water supply under waste flume trestle

Track system below plant showing the four loading tracks and gravel storage at left

Looking from roof of plant toward the pit where a lake was formed when sands were removed

Sand storage pile and reclaiming crane



A corner in the machine shop

This consists of four steel bins of 80-yd. capacity, which are kept full by two bucket elevators from small track hoppers, over which cross-dump, hopper cars are spotted and dumped, the material being elevated into either of two bins by each elevator. Three

Discharge end of sand re-washer at Nickel Plate plant

grades of gravel and one of sand are on hand at all times.

The operating personnel of this industry is comprised of Joseph G. Mayer, president and general manager; H. F. Rath, secretary, in charge of sales; L. E. Redding, superintendent of operations, and an average of 15 to 20 employes.

Curing Concrete Pavements

A VERY thorough study of the curing of concrete pavements has been carried out in the past year by the U. S. Bureau of Public Roads and the Maryland State Roads Commission. The results are reported in an article in *Public Roads* for September in an article by F. H. Jackson and George Werner, engineer of tests and senior scientific aid of the division of tests of the Bureau respectively.

Curing by wet earth, sodium silicate solution and calcium chloride admixture were tried. The sodium silicate was applied to the finished surface with soft brooms and the calcium chloride was added to the concrete, 2 lb. for each sack of cement.

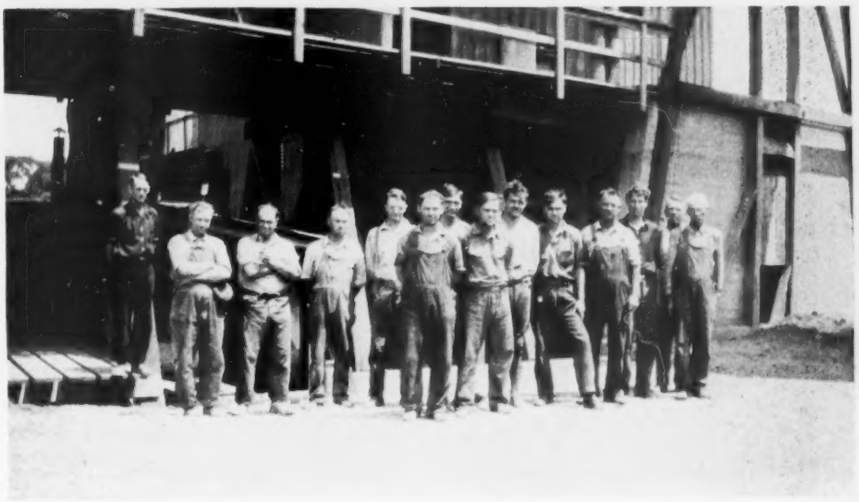
Test Specimens Made and Cured Right on the Job

Test slabs were cast beside the road and cylinders and beams were cast in them. In this way all the specimens had the same curing, whatever their form, and the test is thought to be unique in this respect.

The tabulations of the results show that there is little to choose between the three methods of curing, unless the slightly higher early strength developed by the calcium chloride admixture might be considered an advantage. The authors conclude that either sodium silicate or calcium chloride might be used in place of wet earth curing. Regarding the permeability of the concrete and its final density, they say that conclusions should be withheld until the effect of several seasons can be observed, no differences, having developed in a year.

Beside the direct results of the tests, there are details given in the article of the making and curing of the concrete which are interesting. One is the fineness of the sand used, which was too fine to pass ordinary state highway specifications, but the Maryland specifications are very liberal. It had only 1% to 1.5% coarser than 20-mesh, and from 1.5% to 4% was finer than 100-mesh. Although the authors do not say so, it would seem that the use of such fine sand might account for the considerable amount of transverse cracking reported in all the road sections. It might also account for what seems to be a low strength for 1:2:4 concrete in these days. The average compressive strengths at the end of 28 days were 3170 lb., 3095 lb. and 2865 lb. for the three methods of curing, and these strengths were not much increased at the end of a year.

A careful record of temperatures (which varied between 20 deg. F. and 75 deg. F.) and precipitation was kept for the period of curing. Comparing these records with the strengths of specimens representing different ages leads the writers to conclude that temperature changes "were either not effective or that they were overshadowed by more important variables, such as the water content of the concrete."



The 100% efficient employees of the Nickel Plate Sand and Gravel Co.

Lime Burning Practice Based on European and American Observations

Part XIII.—The Raisby Hill Limestone Co., Ltd., Plant in England—More English Visits

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

THE FIRST LIME PLANT visited in England was that of Raisby Hill Limestone Co., Ltd., at Coxhoe, Durham county, a most interesting and instructive plant, although at first sight it presented a startling appearance. Fig. 74 shows half of the quarry face, the lime plant consisting of two kilns, can be also noted at the left. No buildings, no roof; this being the first plant the writer visited in England, one can imagine the peculiar sensations he underwent while walking towards the plant. In a foreign country some things are strange anyway, but this was particularly so.

In Fig. 75, from left to right, are presented T. A. Saint, manager of the plant; Mr. Priest, of the Priest Furnaces, Ltd., whose concern designed and built the two kilns at this plant, is in the center, and C. M. Kay, London representative of the Priest Furnaces, Ltd., is at the right. It is quite apparent that Englishmen have a sense of humor, contrary to the belief of some Americans. Since the visit was paid late in September, the rose bush in bloom becomes of interest as an indication of climate. Taking the rose bush and the lime plant without roof and building, together, one inclines to wonder.

Fig. 76 is a closer and a most interesting view of the plant. It is not often that the taking of such photographs is possible. Gas producers, coal bins, gas flues, kilns, exhaust pipes, elevator for coal and rock, even the railroad cars, all are to be seen in this single picture.

Kiln Details

The kiln shells are 13 ft. in diameter, the shaft in the burning zone is 8 ft. 6 in. in diameter and round. This cross-section is continuous up to the point where the gas is taken from the kiln, which is considerably below the kiln top, as can be noted in the photographs. The active zone of the kilns, therefore, is only between the burners and the kiln gas offtake. The upper kiln portion acts only as storage for rock.

The output of one of these kilns is 35 English or long tons per day. This is equivalent to almost 40 American tons, with a shaft cross-section of only 56.7 sq. ft. This may be considered as remarkable. Especially is this so since the rock is rather crumbly; and while kilns are charged in sizes of from between 8 to 10 in., the lime is drawn mainly in sizes from 4 in. down. In addition the stone is slabby, thus more inclined to obstruct the draft than stone of more irregular fracturing inclinations. Naturally to make this capacity possible induced draft of considerable intensity is necessary.

Fig. 77 is a sketch showing the approximate inside dimensions of these kilns. The expanded rock storage zone, as well as the lime cooler, should be noted; also the center burner, the arrangement where the producer gas enters the kiln, the point where the kiln gas is drawn off. The center burner is a heavy hermatite casting. The active kiln zone is only 40 ft. in height, slightly less than half of the total kiln height. The shaft is round and very small in diameter, compared with kiln capacity expected; but large shafts are not needed, if there is good draft, and if the flow through the shaft is uniform, so the stone surface is all active absorbing heat.

Fig. 74. The quarry of Raisby Hill Limestone Co., Ltd., at Coxhoe, England, with the plant to be seen at the left

Fig. 75. T. A. Saint, manager of the Raisby Hill plant; Mr. Priest, whose firm built the kilns at this plant, and C. M. Kay, of the Priest company

Referring again to Fig. 74, the quarry face (of which only half is shown) is 1¼ mile long and about 190 ft. high. The various ledges of stone have a great variety of chemical composition as shown by the following incomplete analysis of the stone taken from five sources:

Stone analysis	1	2	3	4	5
Ledge	Top lime	Soft dolomite	Dense dolomite	Intermediate	High calcium
Calcium carbonate	77-75%	?	?	90-92%	96-97%
Magnesium carbonate	?	40	40	4-5	Trace
Silica	Under 2	0.5-1.7	0.5-1.7	1.5	?
Iron oxide	5	?	?	?	?

Rock Handling—Use of Waste Heat

The stone of No. 5 analysis is burned. At the kilns it is first unloaded into some very simple rock bins. From these it is drawn into box carts, shown in Fig. 78. These carts are elevated to the kiln top by means of an elevator (Figs. 80 and 81).

Fig. 79 shows the charging floor on the kiln top. Since the gases are drawn off a considerable distance below the top, it is always cool, and by so eliminating expansion and contraction it can be maintained tight-fitting. The charging hoppers are large cast-iron bells, such as are found in a smaller size on some gas producers.

Fig. 80 shows the upper kiln portions, the elevator framework, the housing for elevator machinery, etc. The chute midway between the kilns leads to the coal bunkers; the coal is elevated in the same manner as the stone, thus a separate coal-handling system is avoided.

The points where the gas is taken from the kiln are plainly visible, each kiln has two offtakes, each offtake is equipped with a valve and a clean-out door. There is a working platform around the kilns at that point. The kiln, gas duct, which is brick, insulated, leads to a boiler, and the waste heat in the gas is first utilized to generate steam, and incidentally the gas is cooled for easier handling by the fan.

For the two kilns the 20-hp. fan motor is loaded to about 20 hp. Suction in the duct at the kiln top is 6 in., while 3 ft. above gas ports it is 0.6 in. At the boiler the suction is 7½ in. The boiler is of a tubular type with three hundred 2-in. tubes, 15 ft. long; operating at a steam pressure of 4 to 8 lb., steam is used for humidifying the gas-producer blast only. The boiler requires little attention. It is even equipped with an automatic, feed-water regulator. For starting the plant there is an auxiliary furnace on the waste-heat boiler.

Kiln-Firing Methods

Fig. 81 shows the part of the plant immediately below that shown in Fig. 80; the boiler can be noted at the left.

Coal is burned in the two hand-poked, gas producers. It contains 13,500 B.t.u., with 36% volatile matter and 5% ash. The producer blast temperature was 155 deg. F., which is unusually high. (One may say unnecessarily high.) The producers have a diameter of 10 ft. and burn 1120 lb. of coal per hour each, 13.4 tons per day, or they have a gassification rate of 14¼ lb. per sq. ft. per hour. The blast noted was 5 in. This gassification rate is low, even for a hand-poked producer. American full automatic producers have gassification rates of 40 lb. per sq. ft. per hour.

Each kiln has five producer-gas inlets, three of the four outer ones being shown in Fig. 81. In addition, there is one in the kiln center. The flue circles around the kiln; each burner is equipped with a regulating valve. Since the stone, as was already explained, breaks up and packs in the kiln, insufficient gas entered through the ports at first provided, so more openings were made, one immediately above each of the four gas ports. They can be readily seen in Fig. 80.

These gas inlets are gas ports, not gas burners. No air enters the kiln except through the cooler from the bottom. This method of burning is conducive to long life of lining and especially of the arches. It was stated to the writer that fusion never takes place at the walls, that after six months' operation the lining was still perfect.

Fig. 76. An exceptional view of the Rainsby Hill plant which shows the kilns, coal and rock elevator, gas producers and the other details of the design

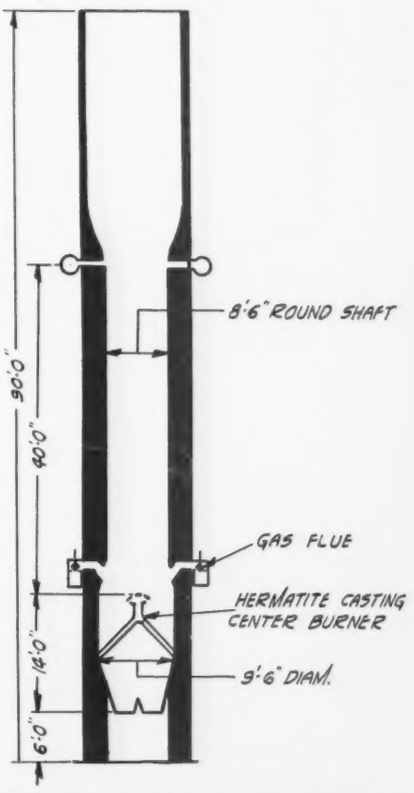


Fig. 77. Longitudinal section of one of the kilns at the Raisby hill plant showing the approximate dimensions of the sections

Kiln Dimensions

The diameter of the shaft above the burning zone, as already stated, is 8 ft. 6 in. The cooler diameter underneath, however, expands out, so even though the cooling zone is only about 13 ft. deep, its capacity is considerable. Fig. 82 shows the draw cart and kiln draw gates. The kiln is drawn once an hour, which will be quite a surprise to many American lime burners. The lime does not stick, and while there are numerous observation openings, there are no special provisions for poking or trimming the kilns.

There is a weekly interruption of about six hours for the purpose of cleaning gas

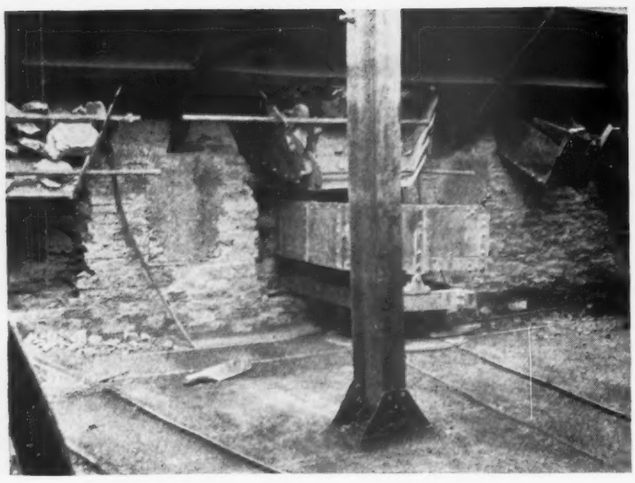


Fig. 78. Loading the stone from the rock storage bins to small cars which are then elevated to the top of the kiln

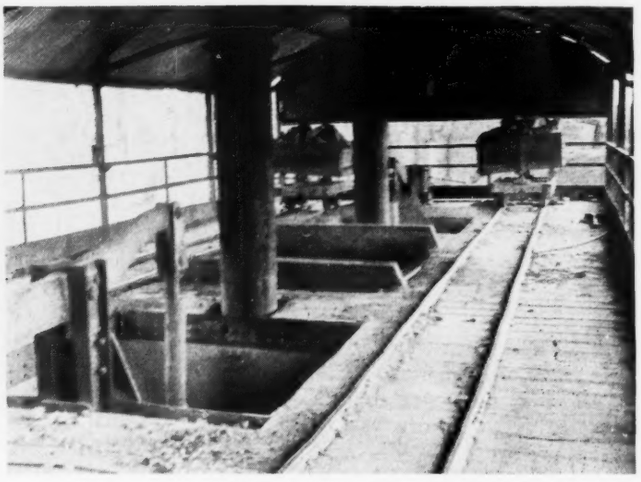


Fig. 79. The charging floor on top of the kilns, showing the charging hoppers at the Raisby Hill plant

flues, but the average daily capacity of 35 tons takes this into consideration. Fuel efficiency is very good but apparently could be bettered; to use so much steam in the producer blast can do only harm to the kiln. It is rather likely results would be better, if the heat in the kiln waste gas were sacrificed, and a small amount of kiln gas used in the producer as the endothermic agent. This would simplify the plant, and the gas generated would have a higher CO and a lower H and CO_2 content. But these are comparatively small faults. The plant as plants go certainly is most interesting and a credit to the designers. The structural work is well, even beautifully executed. There is little of the crudeness so common in most lime plants.

Bowen and Shaw Plant at Wirksworth, England

In Fig. 83 another kiln of the same type is shown. This kiln is the plant of Bowen and Shaw, at Wirksworth, in Derbyshire. The same general arrangement can be noted, except that there are some dimensional differences, and the kiln charging system, which is the simplest possible, is different. This kiln produced 1100 tons (of 2000 lb.) per month for over a twelve-month period. The fuel consumption was 4.86 to 1, with 13,000 B.t.u. coal. The lime costs were as follows on a 2000-lb. ton basis:

Stone	$0.54 per ton of lime
Fuel	0.98 per ton of time
Labor	0.32 per ton of lime
Maintenance	0.12 per ton of lime
Power	0.27 per ton of lime
Total	$2.23 per ton of lime

One would have to go some to find anything equal to this in America; yet in England, at Dysart, where labor and power are cheaper, lime is produced for $2.04, even though the coal cost is $4.70 a ton of 2000 lb. These figures appear extremely low, but on the other hand the plant is extremely simple. If the quarrymen charge the kiln, it would not be too difficult for one man to operate the entire balance of the plant, firing the producer, drawing the kiln, dumping the lime into the railroad car and still have

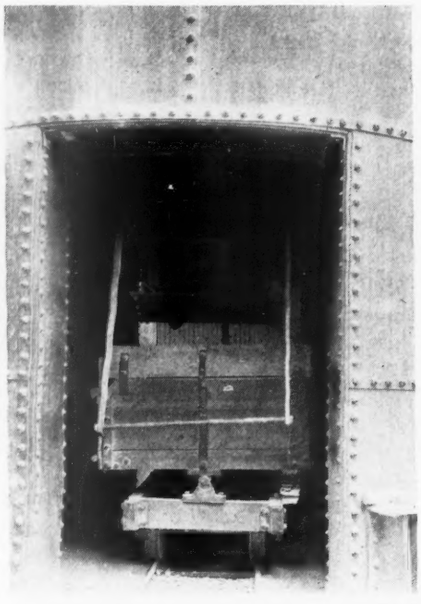


Fig. 82. The draw car and one of the kiln draw gates at the Raisby Hill plant

Fig. 80. A close-up of the kilns, showing the elevator for handling stone and coal and the offtakes at the platform

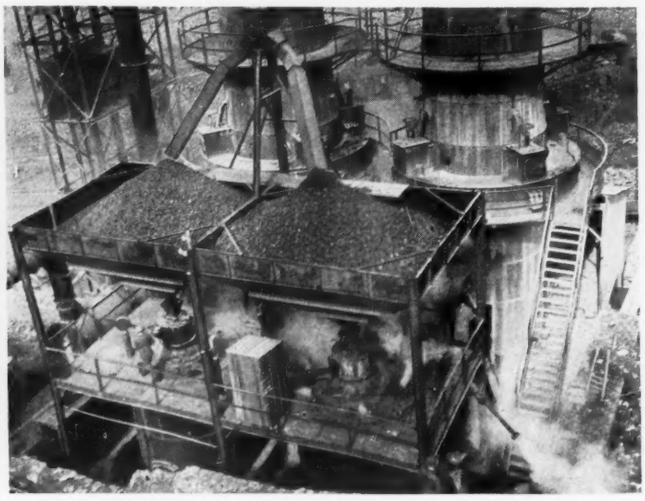


Fig. 81. Looking down on the lower portion of the kilns, showing three of the gas producer units

Fig. 83. The kiln and plant of Bowen and Shaw, at Wirksworth, England

time to spare to smoke a pipe. Arrangements such as these, although seldom possible, should be kept in one's mind as standards of what is possible in simplicity of operation. Too many plants get burdened up with various contraptions that only increase overhead, labor and fuel costs.

(To be continued)

Pumice

THE CONSUMPTION and value of pumice for 1928 will probably show a slight increase. Some of this increase can be traced to its increasing use as a sound insulator and as an aggregate for light weight concrete slabs for building purposes, especially fireproof roof slabs. This is particularly true on the Pacific Coast, where enormous tonnages of pumice sands is cheaply obtainable in Mono Lake county.

The deposits at Mono Lake have been exploited several times in the past with indifferent success, and in 1925 the California Quarries Co., Los Angeles, built a small plant for screening and separation of the pumice sands from the siliceous gangue. This plant was replaced by a new one early in 1928 and has been in successful operation since. This company has coöperated with California manufacturers of acoustical or sound deadening products, and is reported to be shipping several cars per day to California points and some to eastern points.

The deposits mined by the California Quarries Co., are located in the western central portion of the state and consist of partially re-cemented beds of pumice sand that are probably a weathered product. The valued beds are mined using a modified room and pillar system locally referred to as the long-well system. The material is given a preliminary crushing and the pumice separated by screens in conjunction with air separation. The operation is so conducted that a wide variety of accurately sized grain particles are obtained, ranging in size from ¼-in. to fine powders.

As the operation is on a narrow-gage railroad system, the material is all sacked for shipment and transferred to standard gage rails later. Owing to the extreme lightness of the material a box car will hold less than 20 tons.

Another pumice deposit that is reported to be under development is that owned by W. A. T. Agard, 2022 Woolsey Street, Berkeley Calif. This deposit is located in Oregon and consists of 230 acres of pumice-bearing ground, and in the past has supplied eastern markets with lump pumice. The present operators expect to install necessary crushers, screens, etc., to produce the more easily marketable small sizes.

Pacific Coast producers believe that a tariff on pumice should be put on this product to protect them from cheaper Italian importations.

The pumice used for abrasive is given by the Department of Commerce reports as follows:

Year	Tons	Value	Per Ton
1920	41,834	$114,433	$2.74
1921	37,108	158,540	4.28
1922	45,262	175,600	3.88
1923	56,575	214,169	3.80
1924	43,651	190,253	4.36
1925	40,380	179,020	4.45
1926	53,887	208,504	3.75
1927	53,298	221,481	4.15

With these figures in mind it is readily seen why one operator comments:

"As both pumice and diatomaceous earth would be classed as a silica with silica sand, then respecting the importation of these products, pumice from Italy and sand and glass from Belgium, can only say there is no excuse for the present situation. The West can supply all the raw material and a little thinking on the part of Congress would result in sufficient protection by way of import duty to make it possible to overcome even the difference in freights to central markets, and the Eastern seaboard. Taking particularly the item of pumice as an instance, Congress has been playing into the hands of Italy for several years and if our grade of pumice were not superior we would not be able to compete for the small percentage that we now have. Our wages are $5 or $6 per day—freight from Pacific Coast to Chicago $14 per ton by rail and to Atlantic Seaboard by steamer $14 per ton, while the Italian pumice produced by convict labor at 10 cents per day with a freight rate to New York of about $5 per ton. With these figures staring one in the face it should be quite apparent to any thinking person that when the Italian pumice dealers considered it worthwhile they would simply put us out of business, as they have done before."

General view of the Western Lime and Stone Co. kilns and plant at Grimm, Wis. This plant was rebuilt after a recent fire

The Rock Products Industry of the Central Northwest

Editorial Adventures in a Little Explored Rock Products Territory

By Walter B. Lenhart
Associate Editor, Rock Products

THE TERRITORY described in this editorial letter covered such wide limits and included so many different kinds of rock products that it would be difficult to state in a few words the different places visited other than to say that points as far north as Winnipeg, Manitoba, and as far east as Bruce Mines, Ontario, were visited, with many in between stops in the central Canadian region.

Twenty-nine different operations were visited, which included lime, crushed limestone, sand-lime brick, portland cement, gypsum, trap rock, sand and gravel, dimension stone and as a diversion the iron mines at Hibbing, Minn., were included. To describe in detail all of these plants is not the purpose of this letter, but only to touch the high spots and with later articles cover some of the newer plants. The iron mines at Hibbing were included, as it was hoped that something of interest to ROCK PRODUCTS readers would be seen; and our hopes were not unfounded.

Milwaukee Crushed Stone Industry

Somehow or other I had it in the back of my head, owing to the vast amount of sand and gravel close to Milwaukee, that the crushed-stone industry there was practically nil, but after seeing truck load after truck load of crushed stone on the streets to discover its source became my immediate goal. Three crushed-stone plants were located all within three miles of the city of Milwaukee. Residences, trees and sign boards offered an ideal protective screen, and the surprsinig thing was that they should be so close to the residential portion of the city, and still carry on quarry operations, unmolested. Perhaps the reason that they have not been interfered with by the city authorities can be traced to the depth of the workings and to the method of blasting. No rock is thrown out of the pits during shooting.

These plants are all old but no doubt, if a permanent operating permit could be obtained from the city by these operators, with assurance that they would not be molested, a more modern crushing plant would be installed by at least one of the companies. It would not be a difficult matter to mine this rock from tunnels driven into the face of the quarry, and cheap rock could be secured by proper stoping methods. The three quarries visited all had faces from 85 to 100 ft. high, and practically all of the stone was being taken from the bottom with no lateral expansion. Water seeps in from the upper levels, and the amount handled per ton of rock is considerable.

All of the stone from these quarries is shipped out by truck for use in Milwaukee. Business has been good the past season but prices low. As for the whole state of Wisconsin, the amount of road construction can be summarized by saying that during the latter part of July, 1928, there were 81 detours for motorists. This did not include resurfacing work.

The rock in the Milwaukee quarries is a dolomite, the upper layers being quite soft, but at the present depths the rock is hard and dense and produces fairly clean stone without washing. In two cases hand loading on a per ton basis was used, although at the quarry of the Geo. D. Francey Stone and Supply Co. a P&H, Model 208, electric shovel is used. It is interesting to note that at one time, about 1850, all hydraulic lime was burned from the stone produced from the upper level of this quarry.

Manegold Stone Co.

The first plant visited was the Manegold Stone Co., which was part of the Wauwatosa Stone Co. This later company, until 1925, acted as a sales company for both the Manegold Stone Co. and the Story Bros. Co. These two operations are about one-half mile apart. One of the interesting features of the Manegold plant is its location with respect to the quarry. The plant is placed back about 25 ft. from the edge of the quarry face, and the rock is elevated vertically by means of a single drum hoist to a point about 15 ft. above the floor level of the plant, where the load of rock engages with a hay-carrier type of sheave, and is carried upward and into the mill under an inclined super-structure. The car, containing the rock, has a large hook on its up-hill side that, on arriving at the crusher, engages with a horizontal stationary bar. When the pull line is then slacked, the load dumps itself into the crusher below.

The flow sheet of this plant and that of the Story Bros. Co. are about the same. The rock, after passing through the primary crusher, passes over a grizzly, the oversize of which falls to a secondary crusher. The fines from the grizzly meet the discharge

from the secondary crusher, and are elevated to a rotary screen where four sizes are produced. The 1¼-in. size material falls to a stationary screen with ⅝-in. holes. The

The quarry of the Manegold Stone Co., Milwaukee, showing the frame for the rock hoist on the rim at the right

oversize from this stationary screen passes over a vibrating screen for a final cleaning. Both Hummer and Universal vibrating screens are used.

During the winter months there is very little demand for the larger sizes of crushed stone, so stock-piling is resorted to. Reclaiming is done with Barber-Greene loaders. Both plants have found this method of reclaiming very satisfactory for their needs. The ⅞-in. size is the most popular for construction and road work, and the fines find a ready sale for concrete stone trim and for filling purposes. The company owns two White trucks and a local trucking firm keeps seven trucks in the service of this company.

The officers of the Manegold Stone Co. are W. R. Manegold, president; Mrs. M. Schilling, vice-president; John R. Manegold, secretary, and W. A. Manegold, treasurer. Gus Drach is quarry foreman.

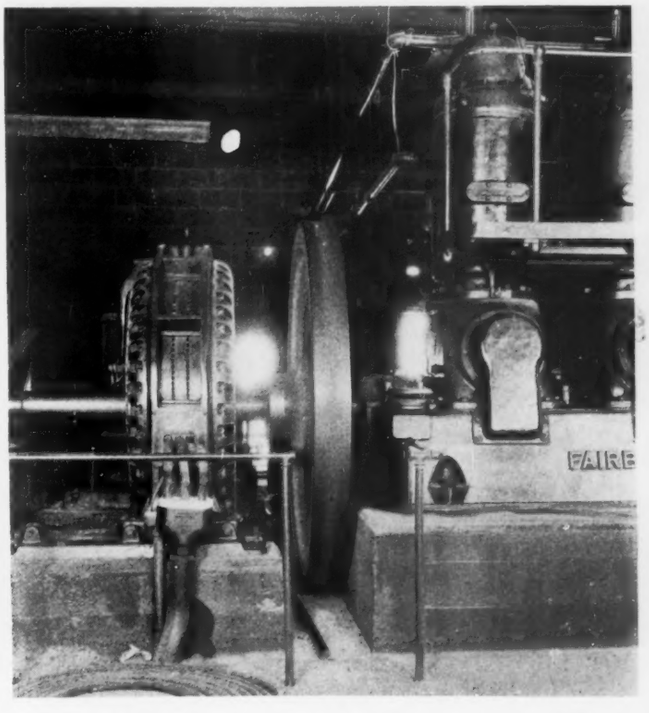
The plant of the Geo. D. Francey Stone and Supply Co., of which Geo. D. Francey is president, is located about a mile west of the Manegold operation. The quarry from which this plant receives its rock was one of the earliest operations of its kind in that vicinity. It did not operate continually, however, and about 18 years ago the present company pumped the water out of the pit and resumed production.

The interesting feature of this plant is that, even though the plant is in Milwaukee where plenty of electric power is available at nominal rates, the company found it more economical to install two 200-hp. Y-type, Fairbanks-Morse, Diesel engine, direct-connected to a type D Fairbanks-Morse alternating current generator, and to generate its own power for plant and shovel. Mr. Francey stated that this power cost him $11 per day, for a daily production of 600 cu. yd. of crushed stone.

Considerable stone is stored in the yard, and is reclaimed by a 1-yd. P. & H., clamshell crane, gasoline-engine driven, that can load direct to trucks, or to Blaw-Knox

Thirty-eight years on the job. Gus Drach, quarry foreman at the Manegold plant

Electric shovel at work in the quarry of the George D. Francey Stone and Supply Co., at Wauwatosa, Wis.



Diesel-driven generators at the Francey plant producing current for the complete operation of the plant

batchers. The clamshell also unloads sand from gondolas, which is brought to the plant from a local pit. This plant has recently installed a Hummer vibrating screen that acts as a cleaner for the dust from the dust jacket of the rotary screen. The oversize from the Hummer gives a product locally referred to as "chips," which is a product more easily disposed of than the fines, and goes mostly for concrete sewer work.

The third plant, that of the Story Bros. Co., Harold W. Story, president; M. K. Lee, secretary and general manager, and

Plant of the Story Bros. Co., at Milwaukee, showing the steel incline for quarry cars

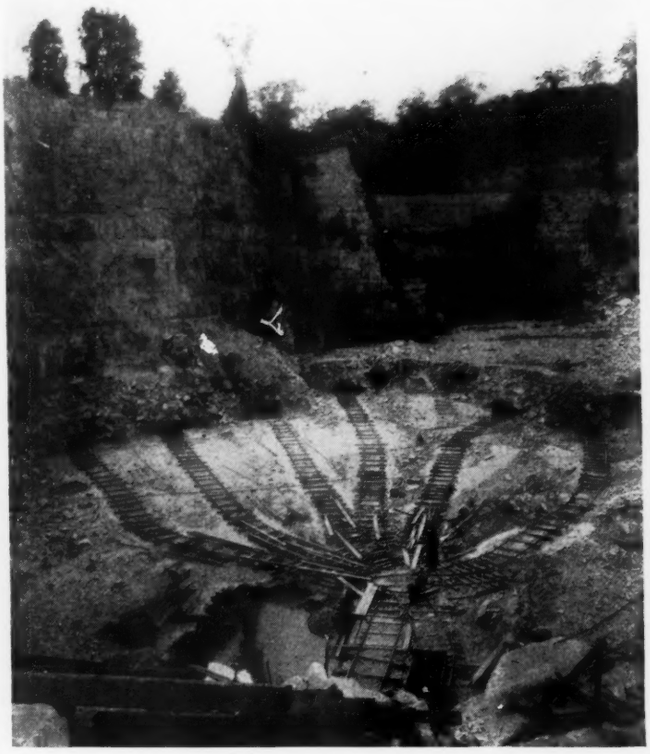
Louis Gissal, superintendent, has been in continuous operation for the past 75 years. The grandfather of the present owners discovered the rock when a tree blew over, there being no previous evidence of limestone on the property.

The rock is loaded on the contract basis, payment being made on the tonnage loaded and delivered to the foot of the incline, where the loaded car is weighed and credited to the loader by the company's weighmaster. Previous to installing the scales the rock was paid for on the basis of car lots. It was found that that installing the scales a considerable saving was effected.

The scales are located at the foot of the incline and the returning empty cars pass around the scales on a separate track to a turntable, that distributes the cars to the various radiating tracks.

Sheboygan Lime Works

The first lime plant visited was that of the Sheboygan Lime Works, Sheboygan, Wis. This company, one of the oldest in the state, built a hydrating plant early in 1926, a description of which was published in Rock Products, February 26, 1927.

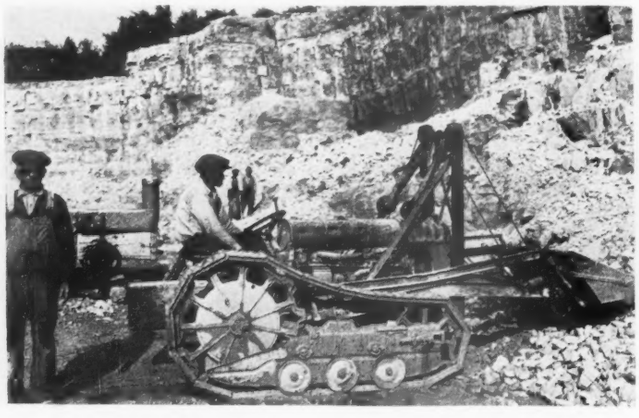


The trackage arrangement in the Story quarry, with all the tracks meeting at one turntable, and with the scales showing just in front of the turntable

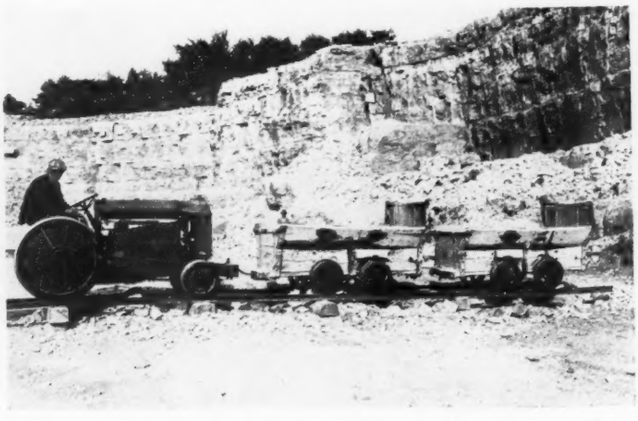
The rock that is now being used for burning is taken from the quarry at a point about 900 ft. from the foot of the incline. The kiln stone and spalls are loaded by a Fordson loader equipped with crawlers of the Trackson Co. of Milwaukee that has a specially designed bucket to handle this class of material. T. E. Fleischer, superintendent, stated that he was able to reduce his quarry force 10 men by the use of this machine, which, however, has been found to be a trifle light for this class of work, but the Trackson Co. is now working on a design for a stronger loader of this type. One thing that was very noticeable was the rapidity and ease of movement of the caterpillar treads, and owing to this feature the shovel carries the load to and from the muck pile over distances up to 50 ft. in an amazingly short time.

The spalls and kiln stone are hauled to the foot of the incline by another more or less novel piece of equipment, a Fordson tractor equipped with flanged wheels for railroad haulage. The rear or traction wheels of this machine are quite large (about 3 ft. in diameter). This piece of equipment was supplied by the Helgerson Foundry Co., Green Bay, Wis.

The Sheboygan Lime Works, like practically all of the other lime producers in that territory, has a small crushing and screening



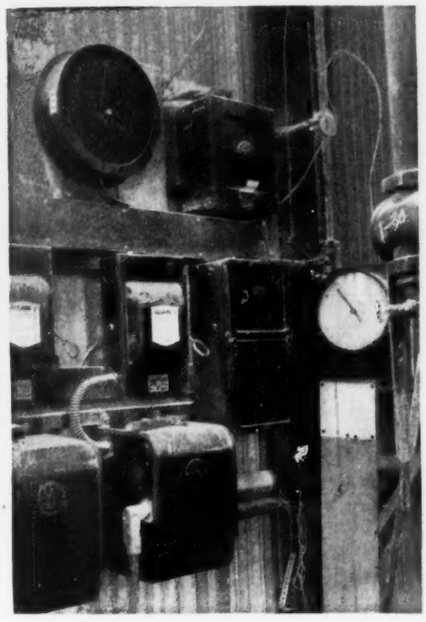
Tractor-loader loading stone to the cars at the plant of the Sheboygan Lime Co., Sheboygan, Wis.



Tractor with flanged wheels used for hauling stone to the foot of the quarry incline at the Sheboygan plant

plant for handling the spalls. In this plant the rock is dumped to a No. 6 Allis-Chalmers, gyratory crusher discharging to an 18-in. bucket elevator that feeds a small rotary screen. The screen is equipped with a dust jacket and four sizes of stone are made. The oversize flows by gravity back to the primary crusher, or can be diverted to a No. 4 Sturtevant jaw crusher, the discharge of which falls to the only elevator in the plant. The fines from the dust jacket fall to a stationary screen producing "chips" and dust. All of this material is hauled by trucks for local road work.

J. H. Carter, assistant manager, stated



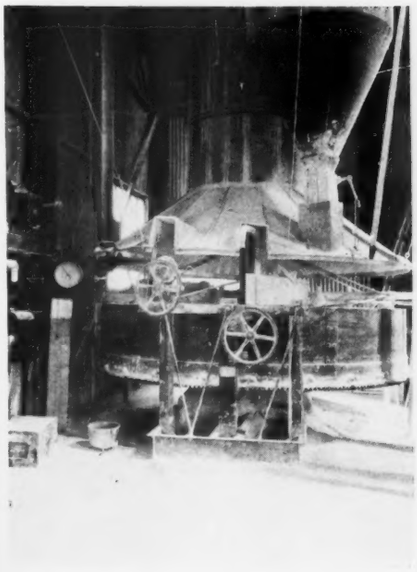
Automatic temperature recording instruments installed at the Sheboygan plant

that the hydrated lime business the past season had been slow, but otherwise business had been good. Prices are still low, in fact too low to operate at a fair profit.

Manitowoc Plants

At Manitowoc, Wis., the plant of the Rockwell Lime Co., located about seven miles north of the town, was visited and three of the plant's four kilns were in operation. Most of the output goes to the company's own material yards in Chicago, where they operate a mortar and a putty plant. The company does not have a hydrating plant, but grinds and pulverizes a chemical lime that is shipped in steel drums.

The lime is drawn from the kilns in wheelbarrows and there allowed to cool. This form of drawing and cooling seems to be standard for most of the Wisconsin plants. The stone is a dolomite. The lime burns white, although the wood fuel blackens the outside somewhat, making it necessary to chip off this skin by hand where the product is to be used for chemical purposes. The color not only is objectionable but the



Hydrator equipped with an overhead batcher at the Sheboygan Lime Co. plant

outer coat is harder and does not make a satisfactory product.

The lime from the kiln after being cleaned with a hatchet is ground, elevated and passed through burr stones for grinding. The discharge of the mills can be packed or sent over a Hummer screen and the oversize returned to the burr stones. Joseph Koehly is superintendent, and on the day of my visit he had rounded out an even 20 years with the company. The operation of the quarry, kilns, lime-grinding plant and the spall grinding and screening plant required 30 men and the kilns produce about 130 bbl. of lime per day per kiln. The rock from the stone-crushing plant is used for road dressing, but is considered too soft for concrete aggregate.

Lime cooling in wheelbarrows at the plant of the Rockwell Lime Co.

Allwood Lime Company

Only a few hundred yards from the Rockwell plant is the plant and quarry of the Allwood Lime Co. The outstanding features of this plant are not the type of equipment, kilns, etc., but its fame as a producer of highly specialized lime products. This feature was described in the June 2, 1923, issue of Rock Products. Miss Mary E. Squire, general manager, is a trained geologist and paleontologist and has used her knowledge to isolate several varieties of limestone in the company's quarry, and has conducted research to determine the properties of lime made from the different stones under a variety of burning conditions. Not only has she done this scientific investigation, but she has applied her findings commercially and has developed a large variety of high grade lime products, some of which sell for as high as 40 c. per lb. and is used as "lapping" powder.

Joseph Keohly, superintendent at the Rockwell Lime Co. plant at Manitowoc

Miss Squire believes that the future of the lime business will depend somewhat on the development of new products and new uses for lime. She is backing her belief by installing a modern research laboratory in the city of Manitowoc, and has placed Victor K. Hendries in charge as research chemist. Miss Squire believes that more attention should be given to the quarry, "Know your limestone first and do not pay so much attention to lime burning" is her formula. When asked regarding the use of lime for plaster with specific regard to the use of accelerators, Miss Squire said that a fast setting lime mortar is apt to crack and it is not the natural setting process; "let the gypsum people have that business," she said.

In working out the problems connected with the burning of lime an experimental kiln has been erected using producer gas as

A wide variety of limestones are to be found on the lower level of the quarry of the Allwood Lime Co. at Manitowoc

Experimental kiln fired with producer gas at the Allwood plant, at Manitowoc, Wis.

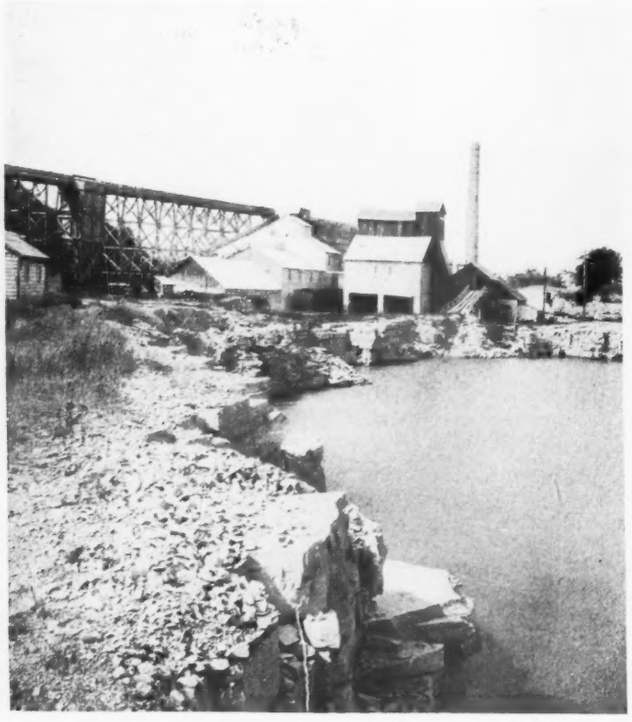
a fuel. The commercial production of lime is from kilns of the ordinary type with no special refinements as to design, but the selection of stone and details of kiln operation are her secrets.

Some of the uses to which her products are put are for cleaning the fine mechanical parts of watches, a variety of medical purposes, one being for making special lime water for use in children's hospitals. Her highest priced lime is marketed under the name of "Horologic" lime, and is, as the name implies, used in watch manufacturing. The amount of this specialized lime used is small and the methods of production are so exacting that it is not likely that many lime producers would care to enter the field. Her main object is to develop enough specialties to keep the plant in operation and give steady employment to her staff and operating crew, many of whom have been with her organization for years.

The operation includes a small crushing plant for spalls, a lime pulverizing and sacking unit, a hydrating unit and a special screening and pulverizing plant. The last two are specially designed for production of the many chemical specialties.

Western Lime and Cement Company

Four plants of the Western Lime and Cement Co. were visited while in that section of the country—the plants at Grimms, High Cliff, Green Bay and Marblehead, all in the state of Wisconsin. A more detailed description of these four plants will appear in later



General view of the Western Lime and Cement Co.'s kilns and hydrating plant at Marblehead, Wis.

Dimension stone is one phase of the Western Lime and Cement Co.'s operation at Marblehead

The three-kiln plant of the Western Lime and Cement Co. at High Cliff, Wis.

General view of the Green Bay, Wis., plant of the Western Lime and Cement Co.

issues of Rock Products.

The Western Lime and Cement Co. has its head offices in Milwaukee; B. B. Williams is vice-president; V. F. Nast, sales manager, and E. E. Long, general superintendent. The latter has headquarters at Fond du Lac, Wis. This company has nine plants in operation in Wisconsin with a total of 68 kilns. It also has several other plants that did not operate in 1928. The company has several hydrating plants and markets hydrate under the trade name of "Limate." Mr. Nast reports a fair volume of business.

Kilns of the Nast Lime Co., at Marblehead, Wis., under construction

The cement plant of the Manitowoc Portland Cement Co. was included in the trip. This plant started operations in May, 1924, and a complete description was published in the September 26, 1924, issue of Rock Products. Since then changes and improvements have been made, which will be described later.

Canada's Growing Quarry Industry

From Manitowoc I went to Duluth, Minn., taking the S.S. *Huronic* of the Northern Navigation Co. to Fort William, Ontario, where is located the trap rock deposits and plant of the Quinn Stone and Ore Co. A complete description of this plant's unusual quarry and screening plant will soon be published.

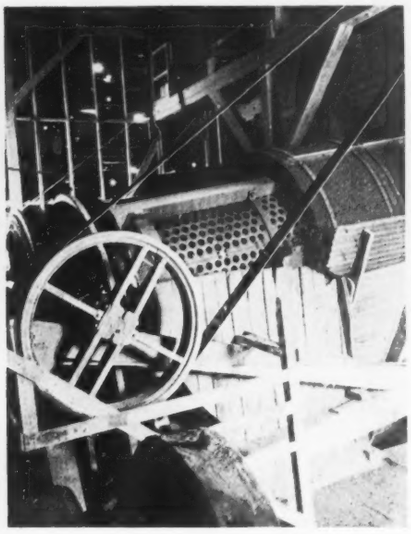
The Quinn rock crushing plant was briefly described in the March 5, 1927, issue of Rock Products, and it supplies a large variety of sized, washed stone for all commercial uses. This stone is now being used for ballasting 147 miles of double track of the Canadian Pacific railway from Fort William, Ont., west to Ignace, Ont.

It is not to be inferred that this company confines itself to the production of ballast only as the plant was built primarily to supply commercial crushed stone to Ft. Wil-

The trap rock quarry of the Quinn Stone and Ore Co., at Ft. William, Ont., showing both the upper and lower working benches

liams and Port Arthur as well as any Lake ports and the company has equipment for loading boats at a rate of 1000 tons per hour for this purpose.

A word might be said regarding the Canadian Pacific railway. A large part of the enormous wheat tonnage raised to the west of Winnipeg is hauled over the Canadian Pacific railway rails to the elevators at Port Arthur and Fort William, Ont. The



Sizing screens in the plant of the Duluth Crushed Stone Co.

up-to-dateness and extreme care of that company's track maintenance through the long stretch of more or less uninhabited country between the water ports and Winnipeg is a thing that is instantly noted. During the fall months wheat movements are so great that ballasting operations stop entirely, and the quarries operate as long as weather will permit, stock-piling the tonnage produced. An exceptionally large wheat crop is reported this year.

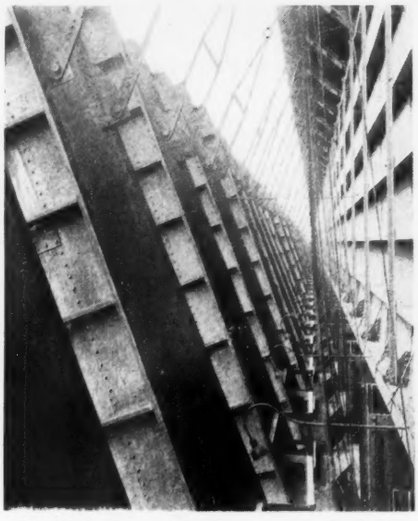
The crushing and washing plant of the Quinn Stone and Ore Co. at Ft. William

Most of the rails of the Canadian Pacific west of Fort William are ballasted with gravel, but for a considerable distance immediately west of Fort William the gravel has been replaced with trap rock.

The material used for ballast is a graded product from 3-in. down to ¼-in. and must be free from fines. To meet the high standard of quality demanded by the railroad, the Quinn Stone and Ore Co. makes a washed and graded product and later blends the material as required.

Canadian Highway Detours Impassable

The highway between Duluth and Port Arthur was reported to be in good shape on the American side, but owing to the Canadian system of repairing roads and not providing passable detours, some six miles of this road can be negotiated only with the aid of teams or tractors that are stationed along the way to aid the motorists. Owing



Looking down the long row of chutes used for loading ore at the Duluth docks

On the ore docks at Duluth, where more than 800 cars are unloaded every day

to the nature of the country, the dense vegetation, it is about as costly to build a detour as it is to build the highway. The stretch of country between the two cities referred to is practically uninhabited. At other places on the road two troughs are provided for the wheels of the cars, and many drivers report considerable inconvenience, as no provision is made for cars passing each other going in opposite directions. It is a case of simply start out and trust to luck. It is expected that this highway will be open again by next season and be in first class shape for the summer tourists.

The return to Duluth was made by passage on the Northern Navigation Co.'s boat S.S. *Noronic*. At Duluth can be found another interesting trap rock quarry, that of the Duluth Crushed Stone Co. This plant was described in the June 28, 1924, issue of ROCK PRODUCTS. The plant is unusual in two ways, one being that there are no elevators, advantage being taken of the natural contour of the ground; the other feature is that all the crushed rock through or over the finishing screens can be returned to the battery of secondary crushers for finer crushing if desired. This latter feature enables the company to produce a graded mixture which will meet almost any specification.

Typical of the gravel found in the Winnipeg district. Note the watch and pencil in the foreground. Picture taken at the yard of the Bar Sand and Gravel Co.

The storage bins and batchers at the old operation of the Duluth Crushed Stone Co.

At the site of the old Duluth Crushed Stone Co. quarry at the head of 57th Avenue West, Duluth, the company has six Blaw-Knox steel bins and four Blaw-Knox batchers attached to them. This distributing yard takes care of the company's business in the western part of the city. Five years ago the company purchased from the Pittsburgh Coal Co. their wooden coal bunkers, which were remodeled to facilitate the handling of

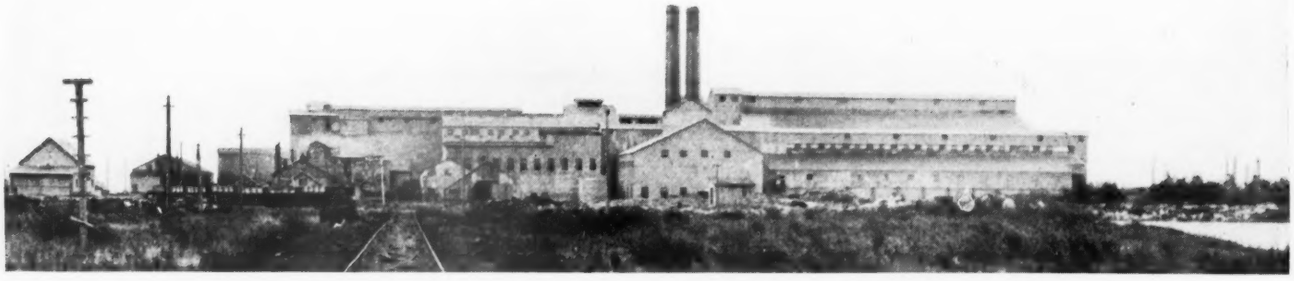
The rock storage bunkers of the City of Winnipeg

Big shovel stripping the overburden at one of the iron mines on the Missabe range, near Hibbing, Minn.

J. H. Graham, of the Bowman Lime Co., and E. Gillis, of the Hill-Gillis Co., of Winnipeg

Provincial Capitol building at Winnipeg, faced with Tyndall stone, a highly fossiliferous limestone

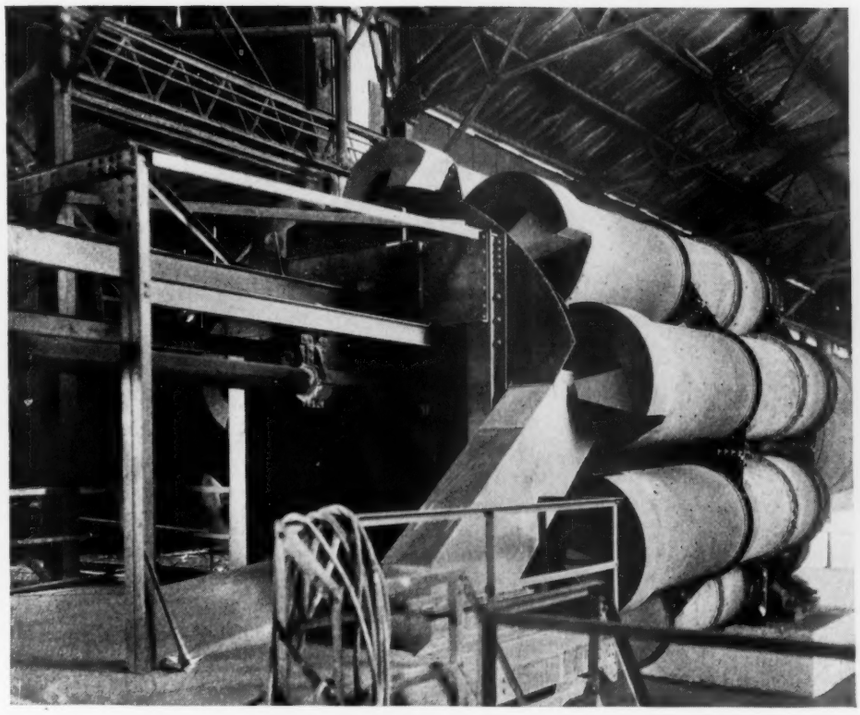
Home of the Hudson Bay Co. in Winnipeg. The trimming from the facing stone are being used for lime production



The Canada Cement Co. plant, at Winnipeg, Man., as seen from near the clay pits

The crusher house, left, and the storage bins, right, of the Northwest Sand and Gravel Co. plant, at Winnipeg

The gravel bank of the Northwest Sand and Gravel Co., near Winnipeg, which is worked with a dragline

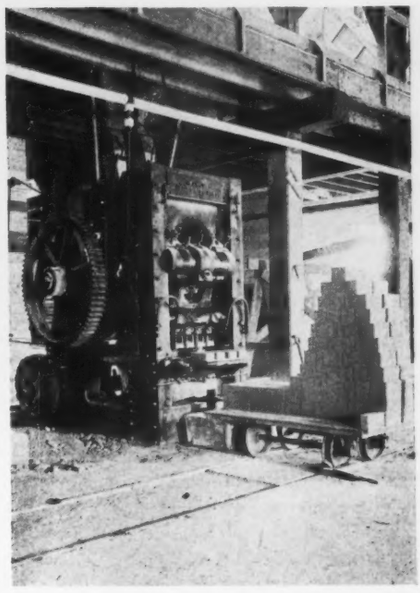


One of the pair of kilns with self-contained coolers at the Winnipeg plant of the Canada Cement Co.

crushed rock through them. This distributing yard is located in the very heart of the city and takes care of all the business in the heart of Duluth. The company does not often ship rock by water, but has facilities for making such shipments. At the quarry, connections are made with four railroads so that carload shipments can be readily made to points away from the head of Lake Superior. At various times during the company's existence it has furnished considerable quantities of large rip-rap stone which has been used in breakwater construction. This stone is loaded by either an American or Ohio locomotive crane, wire rope slings being used to handle pieces weighing up to 25 tons each. The rock quarried is a very hard gabbro and will readily scratch glass. Better than a ton of hollow drill steel is used yearly for the secondary drilling, and the primary drilling is all done with Sanderson-Cyclone well drills. Occasionally it is necessary to run some shallow coyote holes where the rock has been previously broken by blasting but not sufficiently to permit digging with steam shovels.

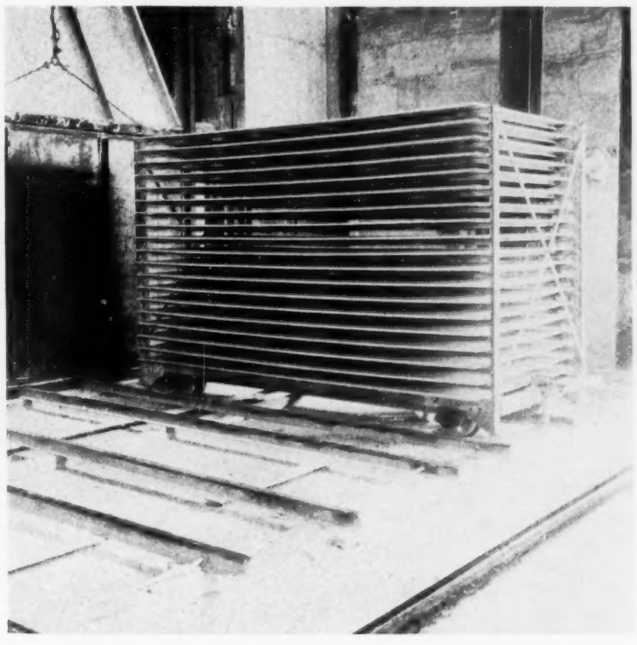
Other Things of Interest at Duluth

A very interesting afternoon was spent inspecting the cement plant of the Universal Portland Cement Co. at Duluth.



Sand-lime brick press at the plant of the Alsip Brick Tile and Lumber Co., at Winnipeg

Another operation at Duluth that is of interest to rock products operators are the



Dryer tray loaded with wet wall board ready to go to the tunnel kiln at the Canada Gypsum and Alabastine Co. plant, Winnipeg

Trays with "whiting" ready for air drying at the plant of the Canada Gypsum and Alabastine Co. at Winnipeg

The bluffs in the distance are the marble quarry of the Manitoba Marble Co. at Mile 39 on the Hudson Bay railroad near Hudson Bay

ore docks of the Duluth, Missaba and Northern railroad. At these docks, which are perhaps as massive and expensive a bit of railroad and dock construction as can be found anywhere in the world, a vast tonnage of iron ore is loaded for transportation to the blast furnaces located in the southern Great Lakes region. At Hibbing, Minn., considerable time was well spent noting how the large tonnage of iron ore is mined, both by pit and underground methods, and a later article on this portion of the trip will contain much of interest to the rock products industry.

Winnipeg Rock Products Industries

Winnipeg, Manitoba, with its extremely broad streets and many public buildings of cut stone, is at the eastern edge of the wheat region of Canada and practically all the grain on its movement to the east passes through that city. It acts as a distributing point for the Canadian wheat belt and for the mining regions to the north. The railroad being built into new gold-silver-copper mines of the Flin Flon district, to the south and west of Hudson Bay, has opened up a highly mineralized country, not only of metallic minerals but of nonmetallic as well. Several samples of marble of exceptional beauty were seen at the offices of the Manitoba Marble Quarries

Quarry site at Hawk Lake, Ont., where there is not even enough soil to hold up the telephone poles

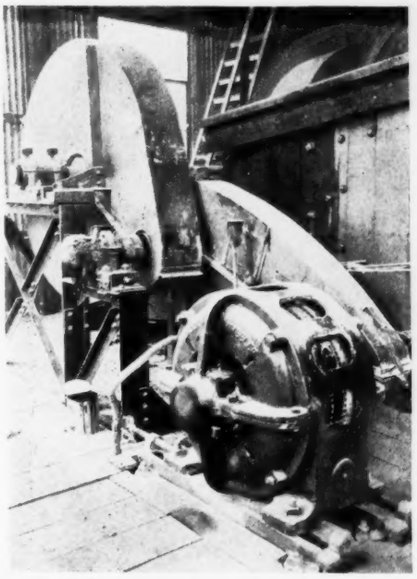
General view of the Grenville Crushed Stone Co. plant and quarry site

The secondary crushing and screening plant of the Grenville company at Hawk Lake

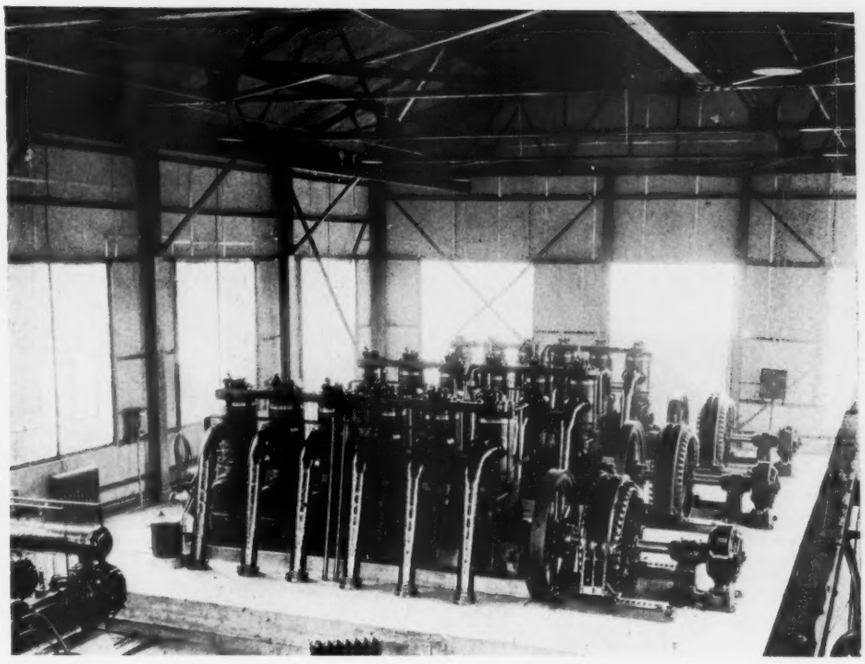
Opening up the large trap rock quarry at Hawk Lake in the wilds of north central Ontario

that came from their recently opened quarry at Mile 39 on the Hudson Bay railroad.

At Winnipeg is a modern portland cement plant, that of the Canada Cement Co., a gypsum plant manufacturing a wide range of gypsum products including wallboard and tile, a modern sand-lime brick plant, lime assortment of sand and gravel producers as plants, dimension stone quarries, and a large well as crushed-stone producers.



Drive motor and gear reduction unit on one of the screens at Hawk Lake



The thoroughly modern power plant of the Grenville company at Hawk Lake. Note the hotel type steam radiators being installed

Two buildings that are of outstanding beauty and impressiveness are the new home of the Hudson Bay Co. and the capitol building of the Province of Manitoba. Both of these buildings are faced with a highly fossiliferous limestone. Many large fossils can be easily seen in the cut-stone faces. Another feature of interest in connection with this stone is the fact that very recently a lime company started the operation of a new kiln, using trimmings from the quarry producing this dimension stone as raw material. One is immediately impressed with the massiveness, size and modernness of the Hudson Bay Co.'s new home, especially after noting on the corner stone that the company was incorporated in 1670.

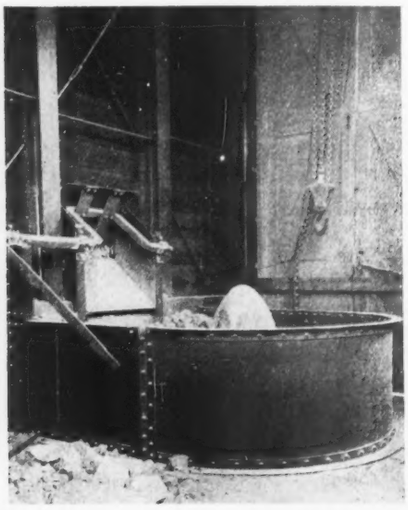
In later articles the cement plant's change from dry to wet process in a climate where temperatures as low as 60 degrees below zero occur; the plant of the Canada Gypsum and

Battery of eight well drills opening up quarry at Hawk Lake, Ont.

The granite at the Hawk Lake quarry breaks with a minimum of fines

Alabastine Co., and a new sand-lime brick plant, will be described.

Owing to the large number of small dealers supplied by cement and gypsum manufacturers, both the Canada Cement Co. and the Canada Gypsum and Alabastine Co., Ltd., combine in shipments a large variety of



One of the four secondary crushers at the Hawk Lake plant

building products. It is not unusual for the cement plant to load part of a car with cement and the car to be switched to the gypsum plant, where not only gypsum products are loaded, but clay tile, putty and hydrated lime, in fact everything that is necessary for construction purposes. Most of such shipments go to small dealers, line yard companies, etc., one operator stated that his company dealt with as many as 1300 small concerns.

The sand and gravel producers all reported a fairly good season with prices holding up better than in the States. The seasons here are short, however. It is interesting to note that only one size of gravel is sold. The bank material is screened merely for its sand content. The sand and gravel producers do not supply any of the material for the city street work, for the city of Winnipeg is burdened with a stone-crushing plant of its own. The bulk of the independent operators' output is for construction work and street repairs that are a part of the street railway's maintenance. A considerable tonnage is also sold for Provincial highway work.

A Brand New Quarry Operation

A second Canadian Pacific ballast plant in

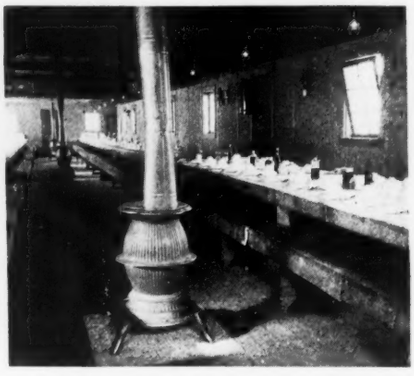
Dr. N. W. Browett, the company doctor for the Grenville Crushed Stone Co., at Hawk Lake

this territory is that of the Grenville Crushed Rock Co., Ltd., which is located on the C. P. R. R. at Hawk Lake, Ont., some 150 miles east of Winnipeg and roughly 400 miles north of Duluth, Minn. This company has built a modern crushing and screening plant and will supply the granite ballast for the C. P. R. from Ignace to Winnipeg, a total distance of 272 miles, all of which is double tracked.

The plant is built to supply only ballast and the company does not expect to ship any rock into the city of Winnipeg for general construction purposes either now or later.

No more beautiful district could be found than that chosen at Hawk Lake for this new industry. The hills are rolling and not very prominent, thickly covered with vegetation, although no large timber grows in the immediate vicinity. The country is dotted with lakes, the shores of which expose glaciated and more or less smoothly worn granites. The top soil is very thin, and at the quarry of the Grenville operation there is practically no stripping. What little stripping is done is by wheelbarrows, and at the time of my visit a large area had been stripped and operation of the plant could be said to have hardly begun.

The amount of overburden can be judged from the fact that it is too difficult to dig holes for telephone poles or trenches for water pipes, so the former are supported by



The boarding house at Hawk Lake will seat 160 men at one time

rocks piled at their bases and water pipes are enclosed in large wooden boxes protected with roofing paper and then filled with an insulating material. The water supply for three 360-hp. "Y"-type Fairbanks-

Crushing plant and stock piles at the operation of the Dominion Trap Rock Co., Ltd., Bruce Mines, Ont.

Loading conveyors and apron at the Bruce Mines plant of the Dominion Trap Rock Co., Ltd.

Morse Diesel engines, that are direct connected to electric generating sets, is pumped from a small nearby lake; and this pipe line is enclosed in a box-like flume about 4 ft. square, filled with manure, and has as an additional precaution a steam line running parallel and alongside the water pipe. This is necessary, as temperatures 50 deg. below zero are common in this region.

In opening up the quarry, the company is driving a cut along the base of the low hill. The down-hill side of this cut is to a depth of about 6 ft., and the up-hill side will give a face of rock at that point of about 20 ft. As the quarry is enlarged this face of rock will extend roughly a vertical distance of 35 to 40 ft.

In driving this cut, ten well drills were available, eight of which were in operation, as well as several compressed-air drills mounted on tripods. As the rock being shot is by nature a hard, tough granite, the holes were spaced at 6-ft. centers with 6-ft. burden; but when this key is cut the company expects to drill on 16-ft. centers with about the same burden.

These drills were running the night of my arrival, and during that night I thought that someone was pounding on a steel rail with a sledgehammer, the noise made by the drills churning in the hard formation was so sharp.

The plant does not size the crushed material but simply screens two sizes: ballast and fines. The rock is clean and does not require washing. Operations, to test out the plant only, were started about the middle of September; and it was found that owing to the unusual nature of the rock some changes will be necessary before resuming operations next spring. After these changes are completed we expect to publish a complete description of this extremely interesting quarry and plant, and how these "starting-up" difficulties were overcome.

Self-unloading boat "S. B. Way" approaching the docks of the Sturgeon Bay Co.

The new plant of the Sturgeon Bay Co., at Sturgeon Bay, Wis., showing the primary crusher house at the left and screen house in the center

Glimpses of Country on the Way to Bruce Mines Quarry Operation

Returning to Duluth, via Winnipeg, and then traveling eastward to the trap rock regions of North Georgian Bay, an arm of Lake Huron, to examine the operations of the Dominion Trap Rock Co., was my next objective.

To describe the trip from Hawk Lake to Bruce Mines, Ont., would require too much space if in a narrative form, so I will adopt the style of a popular columnist for the balance of the trip. . . . Hawk Lake, Ont., 25 miles east of Kenora. Kenora a summer resort. House boats. Summer homes on lake shore; 6000 population. Peaceful town, right on the lake front. Log rafts galore. Paper mills. A few autos, but only 10 miles of road. A road to Keewatin, the only highway out of Kenora. Autos last a long time there. No place to go but home. Lumber; trapping; forests of tamarack, pine, cedar and birch. Brightly colored flowers. Early fall. More log rafts. A bright red saw mill. A boat building yard. No large hills. Rolling country. An overcoat a good investment.

A small quarry in hillside at Keewatin. Rock-bound lakes. Not swamps, but lakes. Railroad coal supply stored on ground in enormous piles. Reclaimed with steam shovels. Fast wheat trains headed east passing about every 15 minutes. Immigrant car at head of train. All the same as a Pullman, only self-operated. Looks it. Coal stove at one end of car for cooking your own meals. This car just one step lower in the social status than a day coach smoker in the States. Day coach crowded. No highways, so railroad can say, "Take or walk." They take it. Several standing up to ride. Getting to the wheat country. Flat. Farms. Thrashing. A few dirt roads and trails. Winnipeg and to bed. . . . Duluth. . . .

More sleep. Dawn finds Trout Lake on "Soo Line," headed for Sault Ste. Marie. Plenty of sand here. Gravel. Swampy. Old saw mills rotting to pieces. Logged-off timber land. Very sparingly settled. A monotonous landscape. Moraines, glacial remnants. Land more productive nearer the "Soo." Better land drainage. Plenty of farm houses. Not a gallon of paint used in the whole region. Take it back, saw one house painted. Old-style livery stable business flourishes at Rudyard, Mich. Cars loaded with large oak timbers. Probably mine timbers. High-powered lightning rod salesman went through this section recently. Got wonderful results. Natives say very few electrical storms. A graded highway, first one seen for long time. A good place for deer hunting. Forest ranger's lookout tower in distance. Timber fire recently. Small trommel for gravel in distance. Trees uprooted, must have been a blow there as well as in Florida. Another customs' inspection. Three boats loaded with iron and wheat passing through the locks at the "Soo."

More paper mills, log rafts. A steel mill. Charcoal furnaces. Canadian Sault Ste. Marie not impressive. Country becoming more hilly and rough. Asphalt pavement parallels C.P.R. Plenty of sand and gravel. Neat log farm houses, newly whitewashed. School house with British flag on pole in yard. Approaching the trap rock region of North Lake Huron. Dominion Trap Rock Co., an interesting place. The description soon to be published. Sorry to leave there, but must get to Manistique, Mich., to take in some of the lime industry. Very pleasant stay at Manistique.

Down the coast and up again to Sturgeon Bay Co.'s plant. Lots of new work going on at Sturgeon Bay. Plant was loading self-unloading boats. Leatham D. Smith's shipyards at Sturgeon Bay, Wis., where this type of boat is built. New or old boats refitted with his equipment. Off again for more Wisconsin lime plants, including the new Nast plant at Marblehead. The editorial vacation is over.

New Abstract and Book Review Publications

THE Massachusetts Institute of Technology started on January 1, 1928, to publish a booklet containing abstracts of scientific and technical publications and books.

Volume I for January 1, 1928, and Volume II, June 1, 1928, have the various subjects arranged by departments, and cover literature in the fields of aeronautical engineering, biology and public health, chemical engineering, chemistry, a wide range of other engineering fields, physics, mathematics, and conclude with abstracts of the papers presented for doctors' degrees during the previous year.

Progress in the Sand and Gravel Industry*

By J. R. Thoenen
Mining Engineer, U. S. Bureau of Mines

VERY FEW INDUSTRIES can show growth as remarkable as that of the sand and gravel industry during the past five or six years. The production of sand and gravel increased 107% in a five-year period, growing from 95,000,000 tons in 1922 to 197,000,000 in 1927. During the same period the sales value per ton f.o.b. plant decreased only 15%, from 68c. in 1922 to 59c. in 1927.

In order to visualize the phenomenal progress in this industry, the accompanying chart has been prepared showing tonnage and value for each of the past 21 years. The progress is particularly noteworthy when it is observed that the graph shows production to have increased from 37,000,000 tons in 1908 to 197,000,000 in 1927, or 432%.

In point of tonnage produced, sand and gravel outranks any of the nonmetallic minerals except coal. The same statement holds true if the comparison is extended to cover the metallic minerals as well.

In 1927 production of 197,000,000 tons expressed merely as figures conveys little meaning to the average person, but when visualized as if placed in railroad cars connected in a continuous train one begins to comprehend what the figures represent. Such a train would extend in a straight line early 45,000 miles, or nearly twice around the earth. If the same quantity of material were used in constructing a 20-ft. highway it would extend 2½ times around the earth.

With such a vast tonnage being produced annually, it is interesting to note the sources from which the material is drawn. Of the total output of 197,454,000 tons of sand and gravel in 1927, as reported by the producers to the Bureau of Mines, 174,212,000 tons were recorded as produced or sold by 1663 "companies" (corporations, partnerships, and individuals), and hence may be designated as "commercial production." The remainder consisted very largely, if not entirely, of noncommercial production, chiefly used by state and county highway commissions, cities, and similar organizations, and by railroads in their own work.

In the following tables and curves the number of commercial producers and the tonnage produced have been classified according to size of output. This classification is based on the total output of a company, and not on individual plant production.†

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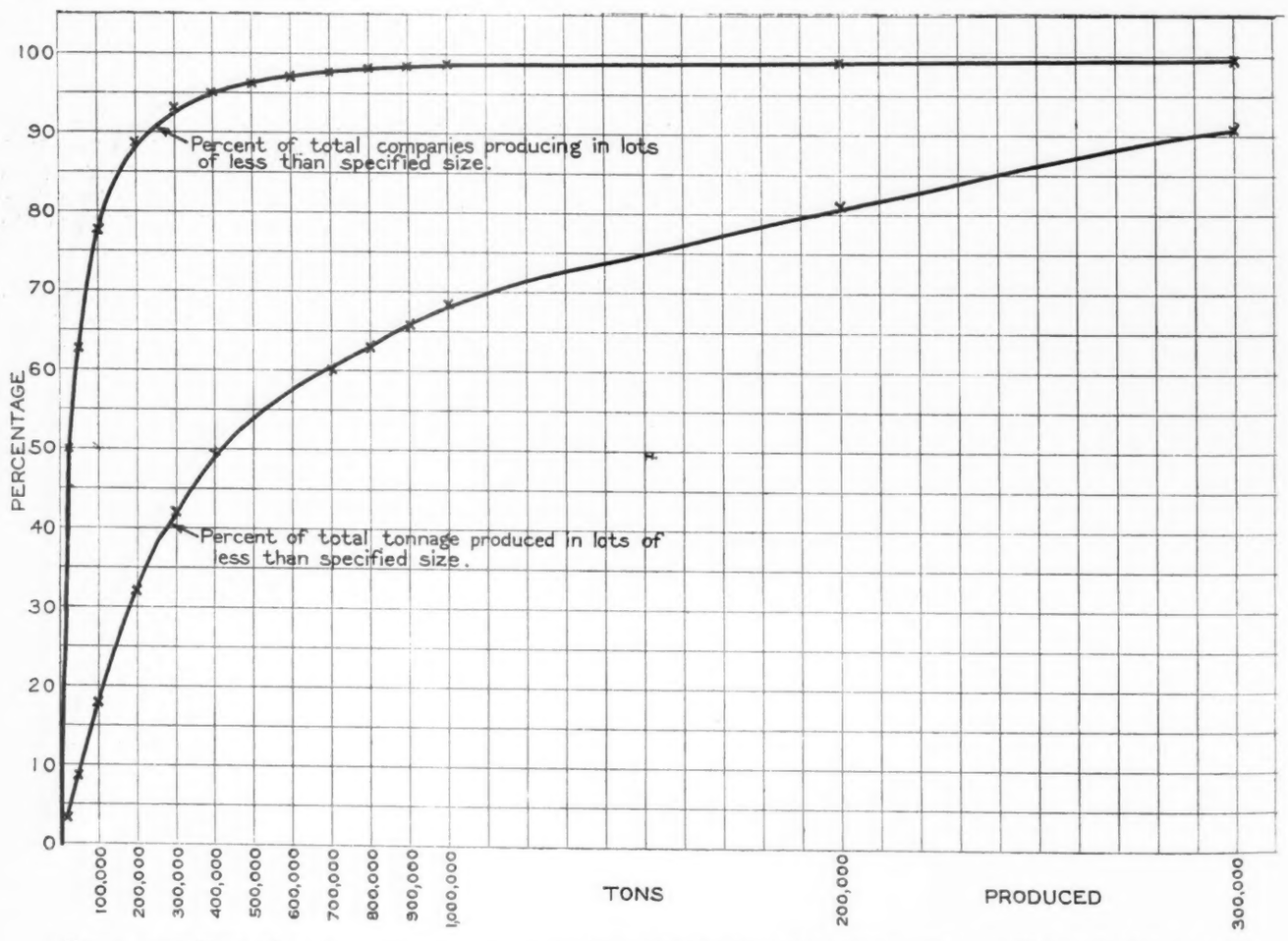
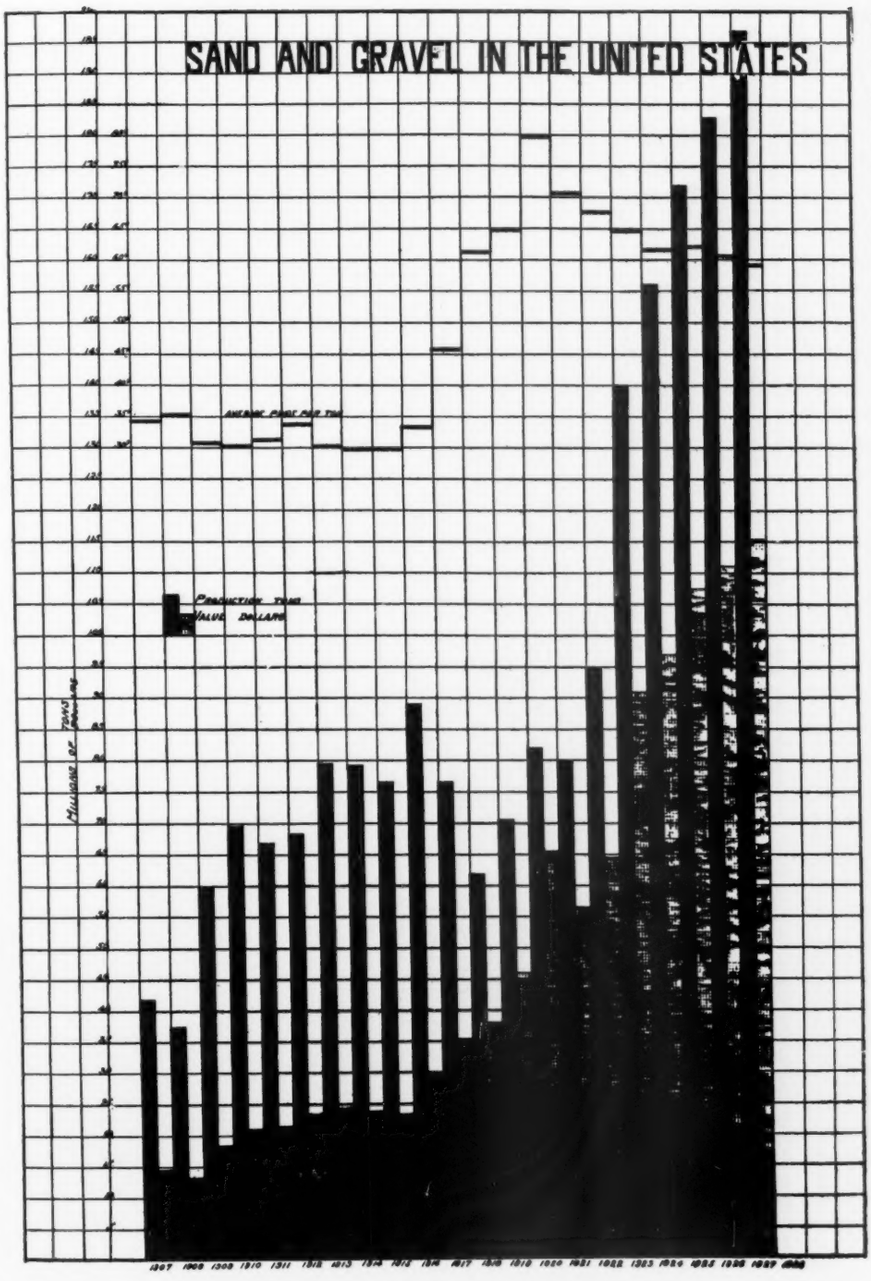
†A large number of companies reported operations of two or more plants to the Bureau of Mines, and some of the companies operated a considerable number of plants at widely separated localities. Only the total for each company has been considered in the classification.



Upper curve illustrating the percentages of companies producing less than the amounts specified, and lower curve showing the total sand and gravel tonnages produced in lots of less than the specified size



Production, value and price of sand and gravel in the United States, 1907-1927. The left-hand column of each pair is the year's production, and the right-hand column is the total value for the year

Of the 1663 companies reporting, 834 produced less than 25,000 tons each; for a 250-day year this is roughly two cars each daily. The relatively large number of small companies—50% of the total number of commercial concerns—actually contributed, however, less than 4% of the total marketed production. On the other hand, a relatively small number of large companies—only 5% of the total—furnished 50% of the tonnage. It is evident that there is a nucleus of strong financial concerns, each operating in a fairly large way in one or more locations; but in every section of the country there are also smaller concerns competing for business.

Viewed solely from a statistical standpoint, the sand and gravel industry appears to be in a healthy condition. The fact that it has succeeded in meeting promptly a rapidly expanding demand, and at the same time has reduced prices, further supports this conclusion. The available statistics do not show whether the prices have yielded adequate returns on the investments of many of the new operators in the field, but they do demonstrate that prices have been high enough to bring about the tremendous increase in output demanded by the nation-wide expansion in highway and building construction.

CLASSIFICATION OF COMMERCIAL SAND AND GRAVEL PRODUCTION, 1927

Size Groups	Companies: Number	Companies: Percentage of total	Companies: Cumulative Per Cent	Production: Tons	Production: Percentage of total	Production: Cumulative Pct.
Less than 25,000 short tons	834	50.15	50.15	6,321,000	3.63	3.63
25,000 and less than 50,000 short tons	223	13.41	63.56	8,055,000	4.62	8.25
50,000 and less than 100,000 short tons	236	14.19	77.75	16,607,000	9.53	17.78
100,000 and less than 200,000 short tons	183	11.01	88.76	25,164,000	14.44	32.22
200,000 and less than 300,000 short tons	72	4.33	93.09	17,410,000	9.99	42.21
300,000 and less than 400,000 short tons	38	2.29	95.38	13,172,000	7.56	49.77
400,000 and less than 500,000 short tons	18	1.08	96.46	7,930,000	4.55	54.32
500,000 and less than 600,000 short tons	7	0.42	96.88	3,676,000	2.11	56.43
600,000 and less than 700,000 short tons	10	0.60	97.48	6,619,000	3.80	60.23
700,000 and less than 800,000 short tons	6	0.36	97.84	4,457,000	2.56	62.79
800,000 and less than 900,000 short tons	7	0.42	98.26	5,948,000	3.42	66.21
900,000 and less than 1,000,000 short tons	3	0.18	98.44	2,954,000	1.70	67.91
1,000,000 and less than 2,000,000 short tons	16	0.96	99.40	23,402,000	13.43	81.34
2,000,000 short tons and over	10	0.60	100.00	32,497,000	18.66	100.00
	1,663	100.00	100.00	174,212,000	100.00	100.00

How the British Columbia Lime Industry Has Developed

THE MEANS by which the British Columbia lime industry has been revived and developed into a factor in the province's prosperity were detailed by R. F. Mather, vice-president and general manager of the Pacific Lime Co., in an address recently before the luncheon meeting of the engineering bureau of the Vancouver Board of Trade at Hotel Georgia, Vancouver, B. C.

"Ten years ago," Mr. Mather said, "the lime industry in British Columbia faced virtual extinction as a result of the increasing use of cement in construction work."

The Pacific Lime Co., then a small concern, turned its attention to the development of new uses for its products and to the opening up of new markets.

Today only a minor portion of British Columbia's lime output is used in the building industry, the speaker said. The agricultural and chemical uses of the product have developed to such a point, however, that the Pacific Lime Co. and its subsidiaries now employ 325 persons, with an annual payroll of $350,000.

Distribution of its products is world-wide. Throughout the United States and Canada its lime is widely used in the paper manufacturing industry; in Hawaii and the Philippine Islands the lime is bought in large quantities by sugar plantations and refineries, and agriculturists in many lands use it in sprays.

"A great measure of our success we attribute to combining the lime business with manufacturing lumber," Mr. Mather said. "At both of our main plants we burn the lime with sawmill refuse. Thus we have no fuel bill and no burner cost."—*Vancouver* (B. C.) *Evening Sun.*

Closed-Circuit Fine Grinding and What It Should Accomplish in the Cement Industry

By A. Anable
The Dorr Co., New York City

THOSE ENGINEERS whose experience has brought them into intimate contact with the metallurgical and portland cement industries are forcibly impressed with the paradox presented by the divergent views of the two industries on the important subject of fine grinding.

The two industries are comparable to a certain extent, since each one is essentially a large tonnage, heavy duty industry, the raw materials in each case must be reduced to approximately the same degree of subdivision, and in each one the unit cost of grinding is a large and governing item in the cost of the finished product. Why, then, does the portland cement industry cling tenaciously to the ancient system of fine grinding, known as open-circuit grinding (or rather, no circuit at all), in spite of the recent impressive advances in the older field of metallurgy in connection with closed-circuit grinding?

The Purpose of Grinding

Let us examine first the purposes of grinding in each of these two industries in order to see in what respects they are related. Of the annual tonnage of gold, silver, copper, lead and zinc ores treated in 1925, 88,580,559 tons, more than 90%, were treated in concentrating mills. In these concentrating mills the ore is ground to that fineness which results in a mechanical unlocking of the mineral from the gangue and permits the concentrating equipment which follows to recover the mineral in concentrated form, and to discard the gangue with a minimum of mineral (Fig. 1). In the cement plant it may be said that the purpose of grinding is to reduce the size of the raw materials to such a fineness that they interlock chemically in the clinkering zone of the kiln to form a complex calcium-aluminum-silicate. Regardless of whether we are concerned with the metallurgist's mechanical unlocking of the mineral or the cement manufacturer's chemical locking or combination of his raw materials, it is nevertheless certain that the control of particle size and the reduction in the cost of pulverizing are the governing features of grinding in both industries. This similarity of the purpose of grinding being established, let us consider the divergent methods of grinding so firmly established in the two industries, and see if what the metallurgist has already accomplished may profitably be the subject of serious thought

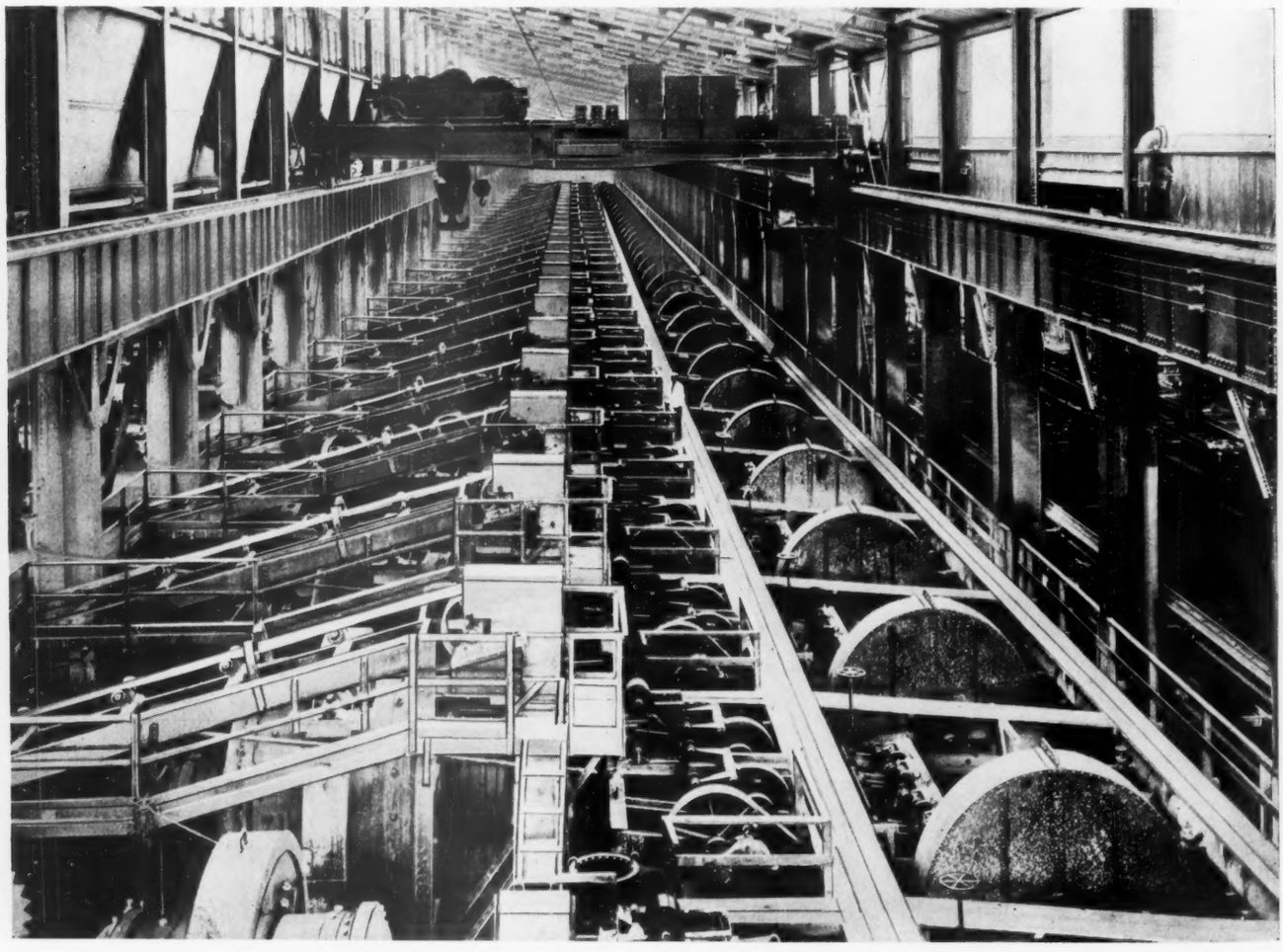


Fig. 1. Andes Copper Co., Potrerillos, Chile. A typical large metallurgical grinding installation which operates its mills in closed circuit with classifiers for grinding. Tonnage ground is about 15,000 tons per day

on the part of the cement manufacturer.

"Open-Circuit" Grinding

Grinding, as now practiced in the cement industry, may be defined as that method which aims to secure the desired reduction of material by a single passage through the mill (Fig. 2). As this method makes no provision for accurate mechanical sizing of the mill discharge, or the return of oversize to the mill, the size of product can only be controlled by variations in the rate of feed, the greater the feed the coarser the product and vice versa. This method of grinding was common practice in the metallurgical industry up to about twenty years ago, but has since been almost entirely abandoned in favor of closed-circuit grinding.

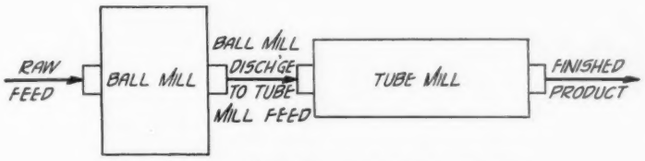


Fig. 2. So-called "open-circuit" grinding

"Closed-Circuit" Grinding

Closed-circuit grinding, the present approved method of grinding metalliferous ores as well as a great many nonmetallics, may be defined as that method of reduction in which the mill is operated in closed circuit with a classifier, which overflows to subsequent treatment only that portion of the mill discharge which has been reduced to the fineness required. That portion of the mill discharge which is returned to the mill by the classifier is called the *circulating load* and may profitably be built up to several times the new feed to the mill. The control of particle size is centered at the classifier, not at the mill (Fig. 3). Not only can the classifier be relied upon to grade the mill discharge accurately at any mesh from 20 to 325, but it permits the mill to be fed at such a rate and loaded in such a manner that large savings are effected in power, wear on mill liners and wear on grinding media, which three items determine largely the unit cost of grinding.

Closed-Circuit Grinding Equipment

The equipment used in the conventional "open-circuit" grinding layout needs no description in this article, as its use is virtually standard practice throughout the cement industry. The equipment used in closed-circuit grinding has been standardized to an even greater extent in the field of metallurgy, but at this time is practically unknown among cement manufacturers. A brief description of the equipment and the layout employed may therefore be given at this point, as a knowledge of the mechanics of closed-circuit grinding will render the discussion which follows much more understandable.

The equipment (Fig. 4) used in closed-circuit grinding consists of a cylindrical wet grinding mill, a classifier and two launders or troughs, the one conveying the mill discharge to the feed end of the classifier and the other conveying the oversize discharge of the classifier to the feed box of the mill. The mill is equipped with a spiral scoop feeder, which picks up new feed and classifier discharge from a rectangular box, and feeds it into the mill through the hollow, feed trunnion. Water is added in this box to bring the feed to the proper moisture content for efficient grinding. The classifier overflows a uniformly fine material, suspended in several times its weight of water.

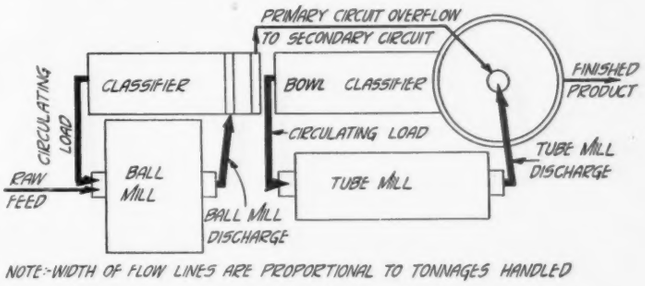


Fig. 3. Closed-circuit grinding

The mills used differ only from those used in "open-circuit" work in that they are generally considerably smaller for a given duty. Coarse grinding to, say, 35- or 48-mesh, is carried out in ball mills (relatively large in diameter and short in length) loaded with balls ranging in size from .5 in. to 2 in. in diameter. Fine grinding to 100- or 200-mesh is practiced in tube mills (relatively small in diameter and great in length) loaded with balls ranging from 2 in. to ¾ in. in diameter. Each mill is equipped with an individual feed box and spiral feeder and operates in closed circuit with one or more classifiers in this complete circuit.

Classification

Classification is the term applied to the separation of material according to particle size. The present discussion deals only with wet classification, or classification of solids mixed with water, in which advantage is taken of the buoyant force of water to separate the material according to its degree of subdivision. The Dorr classifier is used for coarse separations in circuit with the ball mills, while the Dorr bowl classifier is used in circuit with tube mills for making relatively fine separations.

The discharge from the mill enters the classifier continuously in a feed trough near the overflow end. The coarse quick-settling material settles to the bottom of the tank and is advanced up the inclined deck to the point of discharge by the reciprocating rakes. At the upper end, this coarse material emerges from the water, the excess moisture drains off, and the product is sluiced into the mill, feed box with the aid of the water used for grinding.

The agitation near the bottom of the tank,

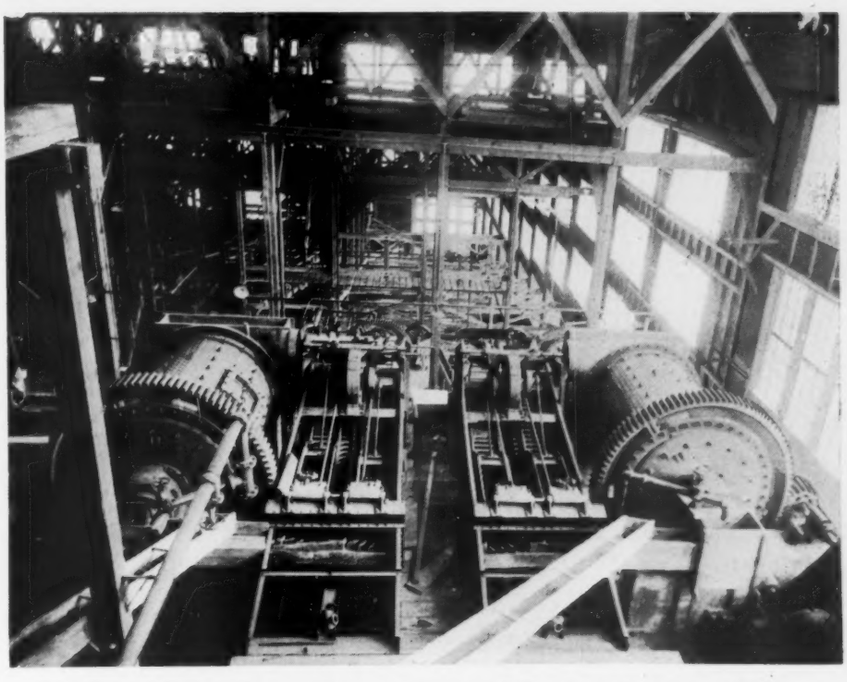


Fig. 4. Canada Copper Corp. A representative closed-circuit grinding installation in which classifiers are closed-circuited with tube mills

caused by the reciprocating rakes, throws the fine material into suspension, and this is carried off with the overflow product at the lower end of the tank.

The bowl classifier (Fig. 5) is especially adapted to fine separation work and is accordingly generally used in closed-circuit with the fine grinding tube mills. The mill discharge enters the classifier through a semi-submerged feed well at the center of the bowl (Fig. 5). The finely ground mateical overflows around the circular weir at the periphery of the bowl, while the oversize particles settle to the bottom and are raked to the central discharge opening by the revolving rakes. This coarse material drops through this opening into the reciprocating rake compartment underneath for reclassification, discharge and finally returns to the mill for further grinding.

The adjustment of the classifier to any given duty within its range of service is quite simple. Once the proper conditions have been established, further adjustment is unnecessary. Briefly, the mesh of separation is controlled by the speed of the mechanism, the slope of the tank bottom and dilution of overflow. The greater the speed, the steeper the slope and the lower the dilution, the coarser is the material in the overflow and vice versa.

Fine separations require relatively high dilutions, and in metallurgy as well as in cement making the fine solids must be dewatered eventually. For eliminating excess water the metallurgist follows up his classifier with a Dorr thickener, a continuous, mechanically-cleaned settling tank, and frequently uses a vacuum filter to dewater further the thickener discharge. The clear thickener overflow is returned to storage and reused as a dilutant or carrier for the materials processed in the mills and classifiers.

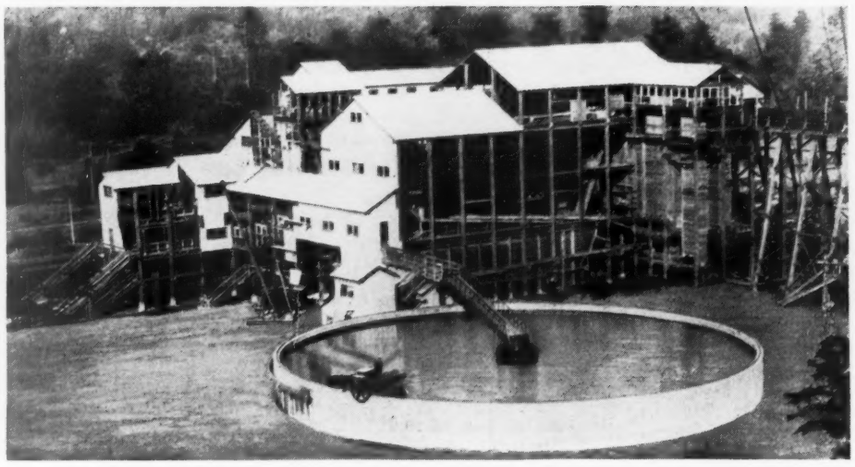


Fig. 6. Thickener for eliminating excess water

Limitations in "Open-Circuit" Grinding

"Open-circuit" grinding requires that the material to be ground must remain in the mill until every particle has been reduced to the size specified. In order to do this, the greater portion remains in the mill long after it has reached the fineness desired; and, as a result, is ground finer than necessary with the consumption of extra power, mill lining and grinding media, which cannot be justified from any commercial standpoint. Furthermore, the presence of this large amount of overground material tends to defeat the purpose of grinding, as the superfines surround the few remaining coarse particles and prevent effective crushing by the cascading balls. Although careful regulation may limit the maximum size of particle in the product, there is no way to hold the product to a minimum particle size, since, by the very nature of the method of grinding, some of the overground superfine particles are reduced to nearly colloidal size, barely distinguishable under the normal microscope.

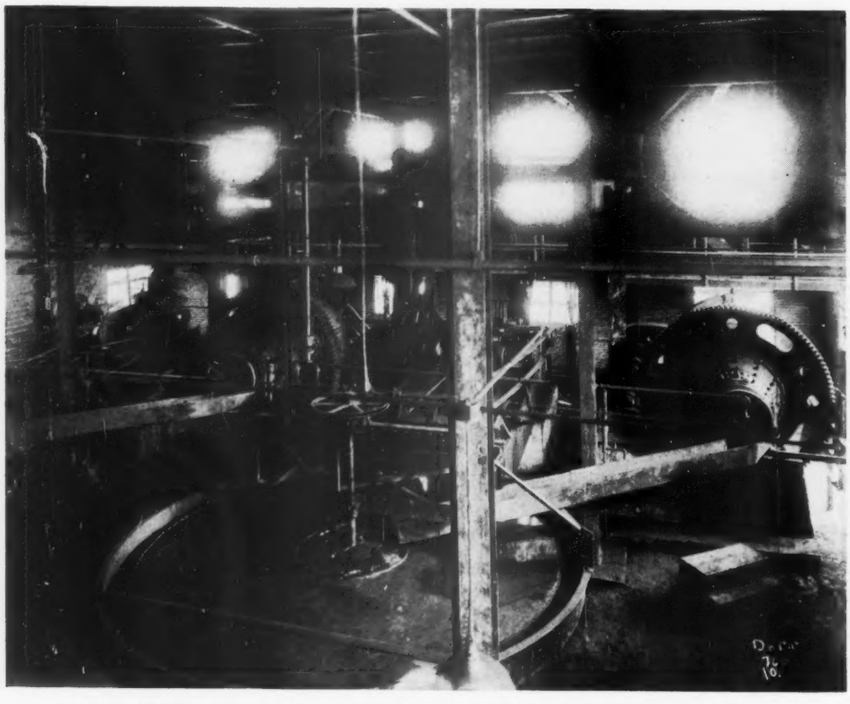


Fig. 5. Ohio Trent Coal and Coke and Amalgamam Co., Toledo, Ohio, a well-arranged closed-circuit installation for fine grinding

Advantages of Closed-Circuit Grinding

When grinding in closed circuit, the mill is fed at several times its "open-circuit" rate, the material races through the mill in a fraction of the usual time and the product entering the classifier contains only about 30-40% of finished material, and even has some material almost as coarse as the new feed. No attempt is made to finish the reduction in a single pass through the mill, but rather every effort is made to remove the material from the system just as soon as it reaches the required fineness, thus allowing the balls to work unhampered on the unfinished particles. The fact that capacity increases without corresponding increases in power is attributable to the more rapid elimination of fines, the reduction of uneconomical overgrinding and the increased amount of coarse material which may be exposed to the cascading balls at one time. In practice the ratio of circulating load to new feed is generally in the neighborhood of 2 or 3 to 1, while in at least two instances the circulating ratio has been carried to 10 to 1 advantageously.

Mill Efficiency and Work Done in Grinding

The fact that the grinding efficiency of a ball or tube mill increases with feed rate has been proved beyond question of doubt in the field as well as in the laboratory. The Mines Experimental Station of the University of Minnesota has been particularly active in this work and has published many contributions to current professional literature, which throw new light upon grinding, some of which will be used in this article.

SCREEN ANALYSIS—KICK AND RITTINGER METHODS OF COMPUTING WORK—The work done in any grinding mill may in practice be measured by the tons of material of the specified size produced in a given period of time, which may easily be calculated from screen analyses of the feed and the discharge and tonnage determinations. The Kick and Rittinger methods are more refined, in that they take into consideration the work actually done in breaking the substance (table below). Rittinger's method is based upon the hypothesis that the work done in crushing is proportional to the increased surface produced, a function of the square of the diameter of the particle. The units used are called surface units (S.U.). Kick's method is based on the assumption that the work done is inversely proportional to the change in volume of the particles, a function of the cube of their diameters. The units in this case are defined an energy units (E.U.). In the curve (Fig. 7) it will be seen that the work done increases with increases in the rate of feed, and that a definite relationship, probably expressed by a parabolic equation, exists between feed and work. This relationship holds true whether we gage work by the tons of a given sized material produced, or by applying the Kick or the Rittinger methods.

It should be borne in mind that the 3-ft. ball mill used in the above tests consumed 4 k.w. during the entire test, regardless of the increased amount of work done on the increased feed. We may therefore express the work done and unit power cost of grinding by the tabluation which follows:

Feed rate lb./hr. ⅜-in. limestone	Finished product in discharge lb./hr. of 65-mesh limestone	Per cent finished material in mill discharge
1000	600	60%
2000	970	48.5%
3000	1200	40%
4000	1400	35%
5000	1650	33%

Effect of High Circulating Loads on Work Done

As has been stated before, the metallurgist, having assured himself by numerous tests that the above relationship exists between feed rate and production of finished product, secures the advantage of increased capacity by closing the circuit with a classifier. A uniformly fine material leaves the circuit as a classifier overflow, while the classifier oversize or rake product returns to the mill in order to load it properly for efficient grinding.

At the Minnesota School of Mines Experimental Station many semi-commercial scale tests were conducted in order to determine the effect of large oversize returns to the mill on work units produced. The data quoted show that work units increase as the circulating load increases up to the point where the circulating load amounts to five times the new feed. The curve is still rising at a circulating ratio of 5 to 1, and it may be said at this point that in practice a circulating ratio or over 10 to 1 has been carried with success (Fig. 8).

Effect of Circulating Load on Minimum Particle Size

Closed - circuit grinding reduces the tendency to produces superfines. With, let us say, a circulating load of 500% the average particle in the final overflow has been passed through the mill five times before reaching that degree of subdivision which allows it to overflow the classifier to subsequent treatment. Accordingly it goes through a progressive reduction with five times as many opportunities for leaving the mill as it would have had were it reduced in an "open-circuit" or single-pass mill. It may therefore be stated that proper classification accurately controls the maximum size of the particles in the finished product, while high circulating loads and the consequent reduction by stages minimizes the formation of superfines.

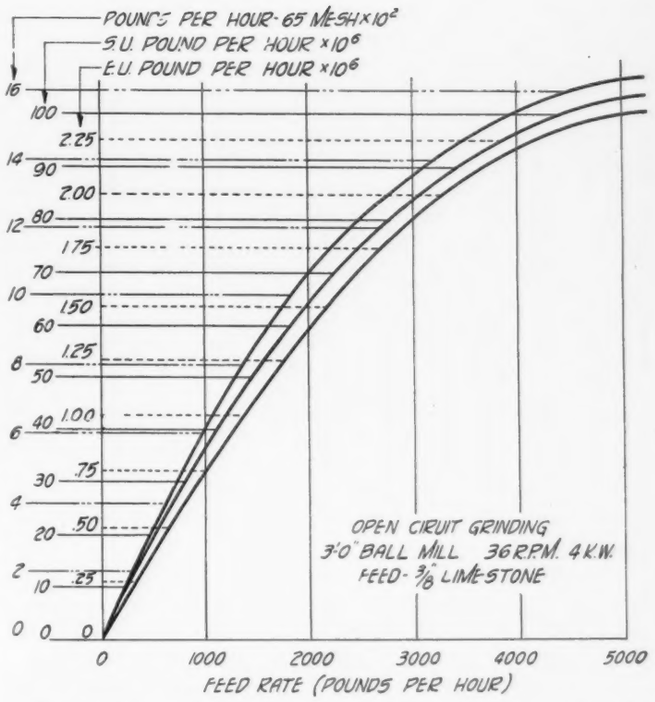


Fig. 7. Curves showing that the work done on the material in a mill increases as the feed rate increases. (Courtesy of Minnesota School of Mines)

Rittinger's work units S.U.	Kick's work units E.U.	K.w.h. per ton of –65-mesh
40,000,000	900,000	13.3
60,000,000	1,500,000	8.25
90,000,000	2,100,000	6.67
100,000,000	2,250,000	5.70
110,000,000	2,350,000	4.85

Examples of Closed-Circuit Grinding in Mining Industries

CLOSED CIRCUITING INCREASES MILL CAPACITY—When grinding a substance so that all of it shall pass a screen of a given size the capacity of the mill may be increased by closed-circuiting it with a classifier. Examples:

(1) Size mill 6x20 ft.
Feed = –6-mesh.
Product = 8% + 100-mesh.
Capacity "open circuit" = 144 tons 24 hr.
Capacity closed circuit = 240 tons 24 hr.
Capacity increase = 96 tons 24 hr.
Per cent increase in capacity = 66%.
—Taggart's "Handbook Ore Dressing," ing," 1927, p. 455.

(2) Wright-Hargreaves Gold Mines, Kirkland Lake, Ont.
Product = –200-mesh.
Capacity "open circuit" = 190 tons 24 hr.
Capacity closed circuit = 275 tons 24 hr.
Capacity increase = 85 tons 24 hr.
Per cent increase in capacity = 44.7%.

(3) Phelps-Dodge Corp., Morenci, N. M.
Product = –65-mesh.
Capacity "open circuit" = 89 tons 24 hr.
Capacity "closed circuit" = 174 tons 24 hr.
Capacity increase = 85 tons 24 hr.
Per cent increase in capacity = 95.5%.

CLASSIFIER DETERMINES CAPACITY, NOT MILL—The capacity of the closed circuit is frequently, if not always, determined by the classifier, not the mill; i.e., additional classifiers increase the capacity of the circuit without any increase in size of the mill. Examples:

(1) Tough-Oakes Gold Mines, Ltd., Kirkland Lake, Ont.
By using two classifiers in closed circuit with a given mill, the capacity of the circuit was 28% greater than the capacity of the mill in closed circuit with a single classifier.

(2) Consolidated Mining and Smelting Co. of Canada, Kimberly, B. C.
Same as example one, only the capacity was increased 35%.

(3) Nevada Consolidated Copper Co., Hurley, N. M.
Product = –65-mesh.
One mill in closed circuit with one classifier:
Capacity = 150 tons 24 hr.
One mill in closed circuit with six classifiers:
Capacity = 800 tons 24 hr.
Capacity increase = 650 tons 24 hr.
Per cent increase in capacity = 433%.

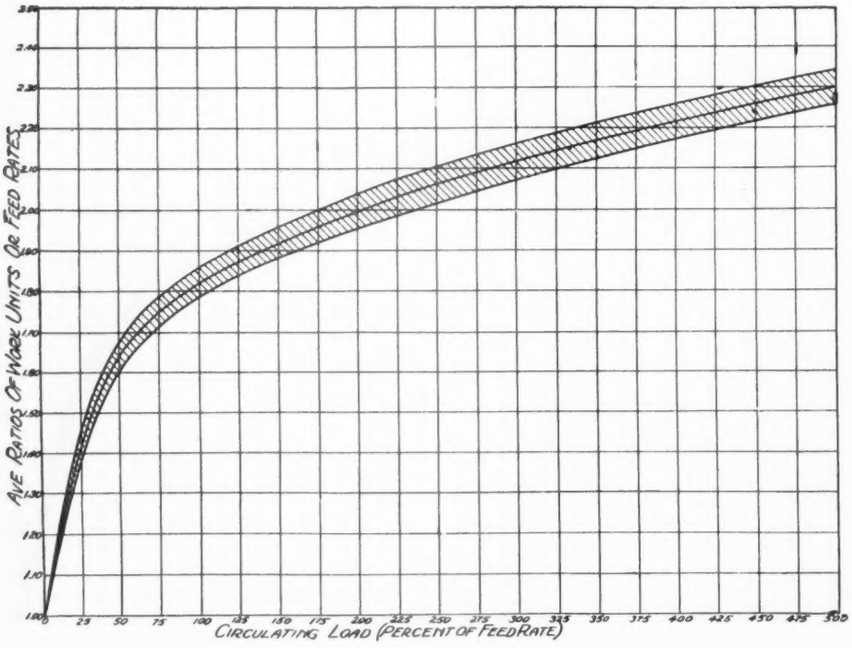


Fig. 8. Curve showing relation between circulating load and the work done in a cylindrical mill. (Courtesy Minnesota School of Mines)

CLOSED CIRCUITING REDUCES UNIT POWER COST—The power required to drive a given mill remains practically constant regardless of tonnage fed, and, accordingly, increased capacity, due to closed-circuiting, results in diminished power costs per ton finished product. Examples:

(1) Lake Shore Mines, Kirkland Lake, Ont.
Closed circuiting increased capacity 44.70%.
Power consumption was reduced 10% (due, no doubt, to better balance with heavy feed).
Reduction in power per ton of finished product = 37%.

(2) Lucky Tiger Mine.
Mill 5x14-ft. tube.
Feed = 11 to 20% +20-mesh.
Finished product = –100-mesh.
Power was 47-hp. throughout tests.
"Open-circuit" capacity = 22 tons 24 hr.
Closed circuit capacity = 37 tons 24 hr.
Tons of –100-mesh 1 hp.-hr., "open-circuit" = 0.016.
Tons of –100-mesh 1 hp.-hr., closed circuit = 0.055.
Unit power cost reduced 71%.
—(Taggart's "Handbook of Ore Dressing," 1927, p. 456.)

(3) Mill 6x20-ft. tube.
Feed = –6-mesh.
Finished product = 10% +100-mesh.
"Open-circuit" capacity = 144 tons 24 hr.
"Open circuit" power consumption = 75 k.w.
Tons of 10% +100-mesh 1 hp.-hr. = 0.0565.
Closed-circuit capacity = 240 tons 24 hr.
Closed-circuit power consumption = 65 k.w.
Tons of 10% +100-mesh 1 hp.-hr. = 0.1087.
Unit power cost reduced 48%.
—(Taggart's "Handbook of Ore Dressing," 1927, p. 455.)

CLOSED CIRCUITING REDUCES WEAR ON LINERS AND BALLS—Through a better loading of the mill with coarse classifier oversize, the abrasion of metal liners and the consumption of grinding media are greatly reduced. Examples:

(1) Lake Shore Mines, Kirkland Lake, Ont.
Consumption of steel per ton finished product.
"Open circuit" = 6.5 lb./1 ton.
Closed circuit = 3.2 lb./1 ton.
Reduction in steel loss = 51%.

(2) Chino Copper Co., Hurley, N. M.
One mill and one classifier in closed circuit.
New feed = 150 tons 24 hr.
Ball and liner wear = 3.2 lb./ton of finished product.
One mill and six classifiers in closed circuit.
New feed = 240 tons 24 hr.
Ball and liner wear = 1.5 lb./ton of finished product.
Reduction in steel loss = 53%.

THE HIGHER THE CIRCULATING LOAD THE LOWER THE UNIT GRINDING COST—Increasing the circulating load of a closed-circuit mill has the same effect on the efficiency of grinding as increasing the new feed to an "open-circuit" mill. Capacity increases and all unit costs decrease throughout the entire range of circulating loads from 0 to 1100% of the new feed, and the upper limit of this relationship has never been reached. Examples:

(1) Quoting from Oughtred's paper on the Sullivan concentrator of Consolidated Mining and Smelting Co., Kimberly, B. C.: "An abnormally high circulating load is maintained, consistent with the mechanical limitations of the machines. Normal circulating load at the present time ranges from 1000 to 1100%, or an equivalent of 3000 tons of sand per standard classifier."

(2) Quoting from the report of high circulating load tests at Nevada Consolidated Copper Co., Hurley, N. M. "Only the structural limitations of Section 7 prevented us from obtaining the ultimate capacity of a ball mill in these tests, but we learned enough to discover that we could reduce the cost of producing —65-mesh flotation feed from around 20c. to about 5c. per ton by using all the classifiers on a single mill. We definitely learned that 3500 tons per day is not too great a feed for the above conditions."

Note: The ball mill referred to was 7 ft. in diameter by 10 ft. long.

Summing up, it may be stated that in the field of metallurgy both theory and practice agree on the desirability of close-circuiting wet grinding mills with classifiers, since closed-circuit operation increases capacity, reduces unit power cost of grinding, cuts down the wear on liners and grinding media and in general permits the mill to be loaded

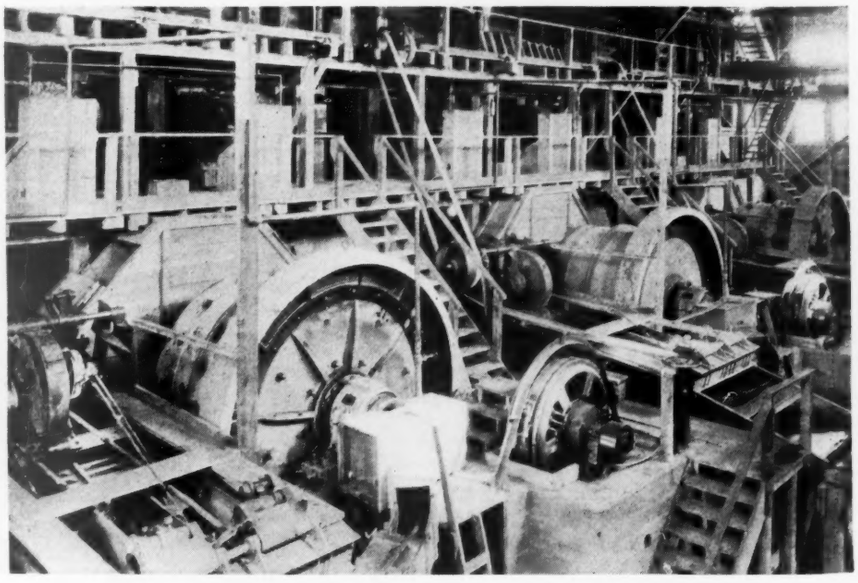


Fig. 9. American Metals Co., Glorieta, N. M., classifiers in closed-circuit for copper concentration

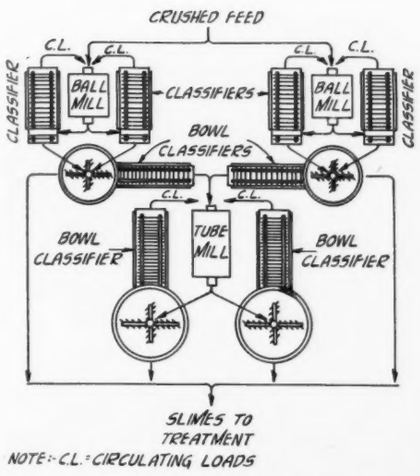


Fig. 10. An efficient two-stage grinding layout with intermediate classification between stages. (Courtesy Minnesota School of Mines)

to its maximum output of material of a specified size. The above advantages have the cumulative effect of reducing the unit cost of grinding, controlling accurately the size of the maximum particle in the finished product and limiting the tendency to overgrind a large portion to semi-colloidal size.

Stage Grinding

Metallurgists and cement manufacturers both recognize that the ratio of the size of the largest material entering the plant to the size of the largest particle in the finished product determines in a general way the number of steps in size reduction. While simplification of crushing and grinding layouts is desirable, it seems fairly well established that each crushing or grinding step loses efficiency when a greater diameter reduction than 4 or 5 to 1 is practised. Accordingly, in both industries stage crushing and stage grinding are resorted to, each unit in the reduction cycle operating as nearly as possible over the range of its maximum effectiveness.

In metallurgical plants, practising fine grinding, two stages of reduction are almost always found, while in certain cases three stages have been found advantageous. Two-stage grinding generally consists of ball mills followed by tube mills, the mills in both cases being closed-circuited with classifiers. In metallurgical parlance, the ball and tube mill circuits are called respectively the primary and secondary circuits, and the classifiers are called respectively the primary and secondary classifiers. Between the primary and secondary circuits, additional classifiers are often placed. These classifiers are open-circuited, in that they do not operate in conjunction with any particular mill, their purpose being to remove the material finished in the primary mills from the grinding circuit and pass on to the secondary circuit only that material which requires further reduction.

An Efficient Two-Stage Grinding Layout

The flowsheet shown represents stage grinding with two steps (Fig. 10). The experimental work on which the general relationship between number and size of mills and classifiers was carried out at the Minnesota School of Mines Experiment Station under the direction of E. W. Davis. This layout has since that time been adopted by many leading metallurgical plants. The ball mill or primary circuit employs standard classifiers and grinds to 48-mesh. The –48-mesh material is fed to the "open-circuit" bowl classifiers, the overflows from which are –200-mesh and accordingly finished product, while the rake products are +200-mesh and accordingly in need of further reduction in the secondary mills. In the secondary circuit, bowl classifiers are utilized for making the 200-mesh separation, and their overflows join the overflows from the "open-circuit," or intermediate classifiers, and pass on to further treatment.

While at first glance it might appear that an excessive number of classifiers is used in this layout, such is not the case. The layout has been developed from research and practice, both of which have shown that the classifier should be the limiting factor in the capacity of the circuit, that the finished product should be removed as soon as produced and that large circulating loads and large classifier capacity increase production much more cheaply than the same result can be accomplished with extra grinding mills.

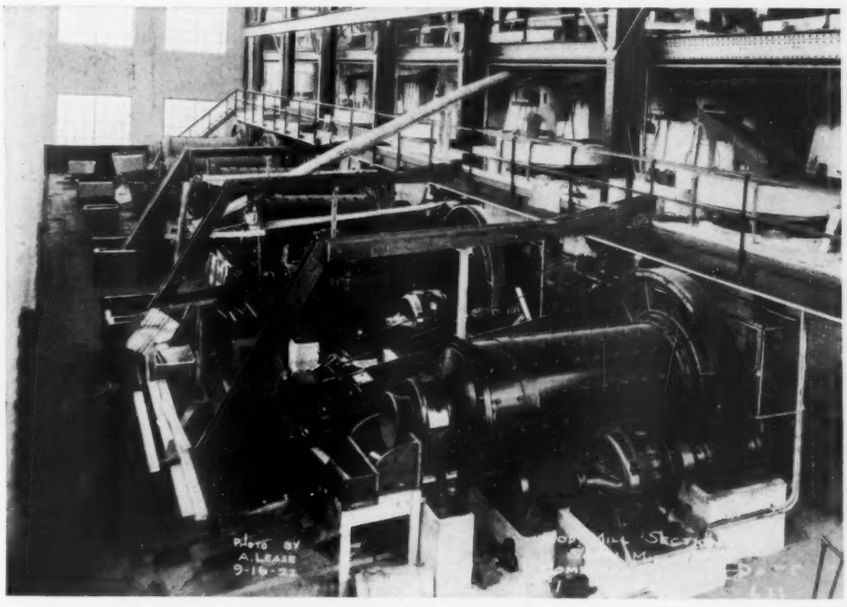


Fig. 11. Closed-circuit grinding arrangement at Homestake Mining Co., Deadwood S. D.

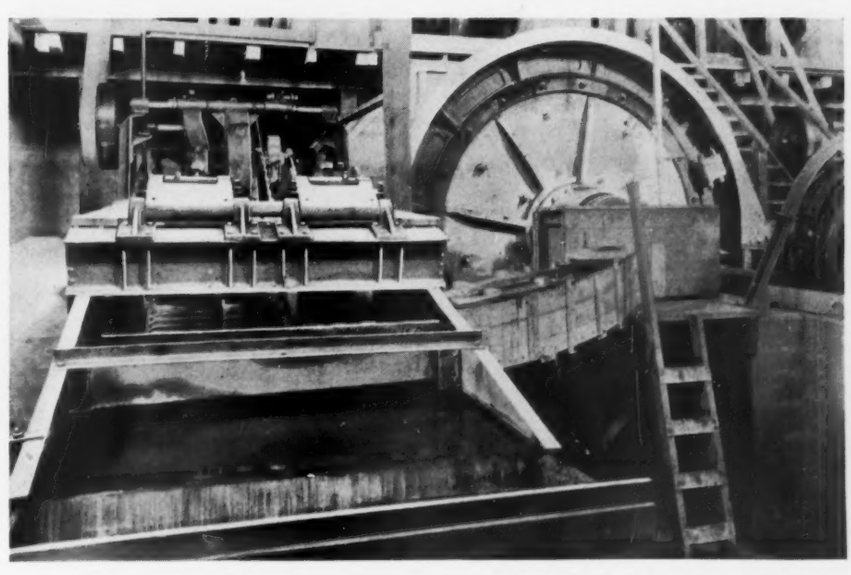


Fig. 12. Mill and classifier arrangement at American Metals Co., Glorietta, N. M., showing finished material leaving the system as a classifier overflow

There is nothing particularly new or revolutionary in the above flowsheet, as it is being successfully used at many of the large concentrating plants in the Southwest and in western Canada. Among those plants that have adopted the primary and secondary closed circuits with intermediate "open-circuit" classifiers are the Nevada Consolidated Copper Co. at its three mills located respectively at Hayden, Ariz., McGill, Nev., and Hurley, N. M., the Phelps-Dodge Corp., Bisbee, Ariz., Allenby Copper Co., Allenby, B. C., and Cananea Consolidated Copper Co., Cananea, N. M. This two-stage grinding layout differs only from cement grinding practice in that classifiers are used in metallurgy, while in cement manufacture the mills are either both in "open circuit" or, in a few cases, the primary mills are in closed-circuit with screens.

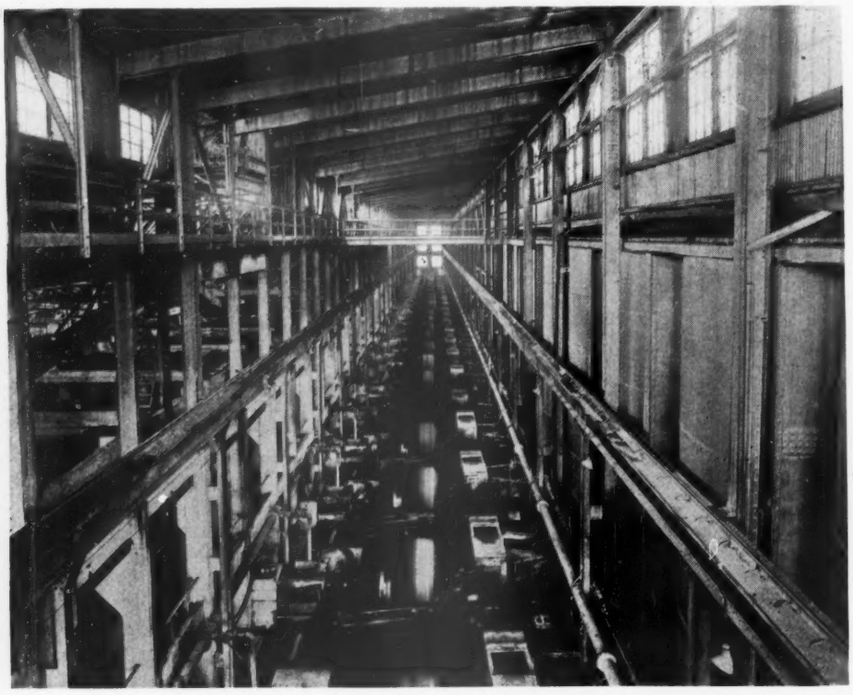


Fig. 13. Nevada Consolidated Copper Co.'s grinding department at McGill, Nev. where approximately 15,000 tons of ore are handled per day

The comments made in this article have purposely been made from the standpoint of the metallurgists. The metallurgist has completed the pioneer work in advanced grinding practice, and, if the cement industry wishes to take advantage of the results of this work, it can accomplish in a year or so at the most what it took the metallurgist more than two decades to complete. The way to advanced practice is well charted and whatever stumbling blocks used to exist have either been removed or a way found to overcome them.

ROUGH ESTIMATE OF POSSIBLE SAVING IN THE CEMENT INDUSTRY—Closed-circuit grinding, regardless of its interest from a theoretical standpoint, will only be adopted when it has been shown to promise attractive savings to the cement industry as a whole. In order to indicate roughly the possible savings which may be secured, a few assumptions will be made based on points proved in metallurgy:

1. Closed-circuit grinding will increase mill capacity 50%.
2. Closed-circuit grinding will reduce wear on mill liners and grinding media 25%.
3. Closed-circuit grinding will produce consistently a uniform —200-mesh product.

The above statements are truisms in metallurgy, and, accordingly, the only assumption involved is that they are equally true in cement practice.

SIGNIFICANCE OF ACCURATE CONTROL OF PARTICLE SIZE—Up to this point closed-circuit grinding has been compared with "open-circuit" grinding on the basis only of expected economies of operation strictly within the bounds of the grinding department. The statement has been made that the classifiers can be relied upon to produce consistently a uniformly fine product which will all pass a 200-mesh screen or finer if desired. This accurate control of particle size should have a very great effect on subsequent treatment of the slurry—calcination in rotary kilns to cement clinker—since research workers have known for many years that the size of the particle affected kiln operation.

General Summary of the Results of Investigation on Fine Grinding

Considerable study has been devoted to the effect of fine grinding on the operation of kilns and the physical characteristics and chemical composition of the finished cement. These investigations, particularly the very recent ones conducted at the United States Bureau of Standards, indicate that contrary to the prevailing impression super-fines, or "flour" as they are more frequently called, do not have beneficial qualities to the degree usually supposed. On the contrary, it would appear that the coarsest material in the raw mill discharge is the governing factor and that a product all of which will pass a screen of a predetermined critical mesh is far superior to one which has a few per cent coarser than the critical mesh and a large percentage finer. With the prevailing technical opinion fairly well agreed that grinding all the material to a specific particle diameter is desirable and that grinding beyond this point does not result in advantages commensurate with the cost, closed-circuit grinding appears to be the most reliable method of securing precisely this type of reduction since by the very nature of it the fineness of the coarsest particle in the finished product is accurately controlled and overgrinding to super-fines or "flours" held within narrow limits.

Additional Phosphate Beds Discovered in Montana

WHEN THE NATIONAL CONSERVATION COMMISSION was appointed by President Roosevelt in 1908, it called attention to the fact, among others, that there was an apparent shortage of phosphate rock in the United States. Inasmuch as phosphate rock is the principal source of phosphorus for plant food, any possible shortage was viewed by economists as a distinct menace to our future crop production. The next season the Geological Survey put a number of geologic parties into the field, especially in the Rocky Mountain States, with the result that thousands of acres in Utah, Wyoming, and Idaho were found to be underlain by high-grade phosphate rock.

The first discovery of phosphate rock in Montana was made by the Geological Survey in 1910. Since then successive discoveries have been announced by the Department of the Inetrior in a series of Geological Survey publications. The latest report in this series, recently issued by the Geological Survey, is entitled "Phosphate Rock in the Three Forks—Yellowstone Park Region, Montana." The region described comprises about 7000 square miles, a considerable part of which is underlain by beds of phosphate rock of workable thickness. In this region, however, the phosphate deposit is thinner and of poorer quality than in other parts of Montana or in southeastern Idaho. The report includes observations on the Western phosphate field as a whole and on the occurrence, composition, and origin of the phosphate rock. It also discusses the region by districts and gives measurements of the phosphate beds together with the phosphate content of the samples analyzed. The report, which is Bulletin 795-G of the Geological Survey, may be purchased from the Superintendent of Documents, Washington, D. C., for 20 cents.

Regional Safety Program for 1929

First Meeting at Chattanooga, January 22

THE FIRST of the 1929 series of regional safety meetings arranged for the cement mill organization by the Portland Cement Association will be held at Chattanooga on Tuesday, January 22. All of the member mills of the association in the southeastern states have been invited and an attendance of at least 100 is already assured. W. H. Klein, general manager of the Pennsylvania-Dixie Cement Corp., is acting as chairman. The sessions will be held in Hotel Patton.

On Tuesday, February 12, the 12 cement mills of the western Missouri-Kansas-Nebraska region will hold their annual safety meeting in the Kansas City Athletic Club at Kansas City. Louis J. Wheeler, superintendent of the Kansas Portland Cement Co.'s plant at Bonner Springs, Kan., is acting as chairman. Large delegations are assured from every mill in the vicinity.

Two days later, on Thursday, February 14, will occur the Texas regional safety meeting at the Baker hotel, Dallas. Charles E. Ulrickson, vice-president and general manager of the Trinity Portland Cement Co., as general chairman, is busy with a local committee arranging a top-notch program.

The regional safety meeting for the mills of Illinois and eastern Missouri will take place at LaSalle, Ill., in the rooms of the Illinois Valley Manufacturers Club in Hotel Kaskaskia on Tuesday, February 26. As this will be the fifth anniversary of the first safety meeting held by the LaSalle group of mills, a special occasion is being arranged and a number of out-of-town and local guests are being invited. John Young, superintendent of the Lehigh Portland Cement Co., Oglesby, Ill., is chairman, assisted by a committee consisting of Richard Moyle, general superintendent of the Marquette Cement Manufacturing Co.; Henry McClarnan, general superintendent of the Alpha Portland Cement Co.; W. E. Gorg, assistant treasurer of the Missouri Portland Cement Co., and W. E. Wuerth, works manager of the Sandusky Cement Co. (now the Medusa Portland Cement Co.).

Success which attended the first safety meeting of the Indiana and Kentucky mills, held at Indianapolis in 1928, has led to plans for a similar meeting on Tuesday, March 5, at Louisville, Ky. The southwestern Ohio mills will also attend. H. D. Baylor, works manager of the Louisville Cement Co., is being assisted with the arrangements by A. C. Brown, vice-president of the Kosmos Portland Cement Co.; W. H. Weitknecht, superintendent of the Mitchell plant of the Lehigh Portland Cement Co.; J. J. Oakes, superintendent, Indiana Portland Cement Co., and W. T. Groner, superintendent, Southwestern Portland Cement Co.

Arrangements are also being made for nine additional meetings of similar character covering practically all cement-producing sections of the United States. The complete schedule is the most extended the Committee on Accident Prevention has arranged so far.

Committee to Study Fatal Accidents

J. B. JOHN, chairman of the Committee on Accident Prevention and Insurance of the Portland Cement Association, is busy organizing a sub-committee to study recent fatal accidents in the cement industry which have become relatively more numerous during recent months.

In an interview a few days ago, Mr. John pointed out that in 1926 there was one fatal accident to every 45 personal injury cases, and that the lowest ratio was reached in 1927 with one fatal to every 46 such cases. The showing made for the first 11 months of 1928 revealed a fatality for every 30 accidents in which a workman was injured. Although total lost time accidents decreased about 23% from 1927 to 1928, fatalities increased from 30 to about 34, a showing which calls for immediate investigation, according to Mr. John. Consequently five of the most experienced operating executives in the industry are being called upon to serve on the sub-committee and others may be summoned to assist as the study gets under way.

Prompt study of the fatal accident situation is characteristic of the aggressive methods employed by the association's Committee on Accident Prevention in its determined fight to hammer down accident totals to the lowest possible level. Several recent fatalities have been astonishing in several respects —occurring as they did in mills where accident prevention work has reached a high level of efficiency. Consequently the reports of the new sub-committee will be awaited eagerly and, it is hoped, will provide the basis for prompt and decisive action.

President of Portland Cement Association Loses Wife

THE death of Mrs. Frank H. Smith, wife of the president of the Lawrence Portland Cement Co., and newly elected president of the Portland Cement Association, occurred on Sunday, December 30, after a long illness. The funeral was held at Plainfield, N. J., where Mr. and Mrs. Smith made their home, on January 2. A host of friends throughout the cement and rock products industry extended to Mr. Smith their sincere sympathy.

Alta Cement Co. Has Options on California Limestone Deposit

THE ALTA CEMENT CO. has secured options on 500 acres of land at Volcano, Calif., and residents of that section state that according to the terms of the option the money is payable in cash during January of the coming year.

Besides the options the company has during the past few weeks been purchasing between twenty and thirty lots on some of the back streets in Volcano. These lots are located in the limestone belt.

Residents of Volcano state that every indication points to the fact that the company will start operations at a quarry shortly after the first of the year. Representatives started to secure options from the various property owners nearly a year ago.

During the first part of August W. D. Binbee, representative of the company promoting the cement project and representatives from the Southern Pacific Co. were in Sutter Creek securing signatures of various landholders along the south side of Sutter creek, from the city of Volcano, for options to purchase rights of way for a railroad line. It is rumored that negotiations are under way at the present time regarding the purchase of the Amador Central Railroad, but no confirmations have been obtained. According to the proposed plans, the road from Ione of the broad gauge type, to be built from that point to Sutter Creek by the Southern Pacific Co. and from there extended by the cement interests to the town of Volcano.

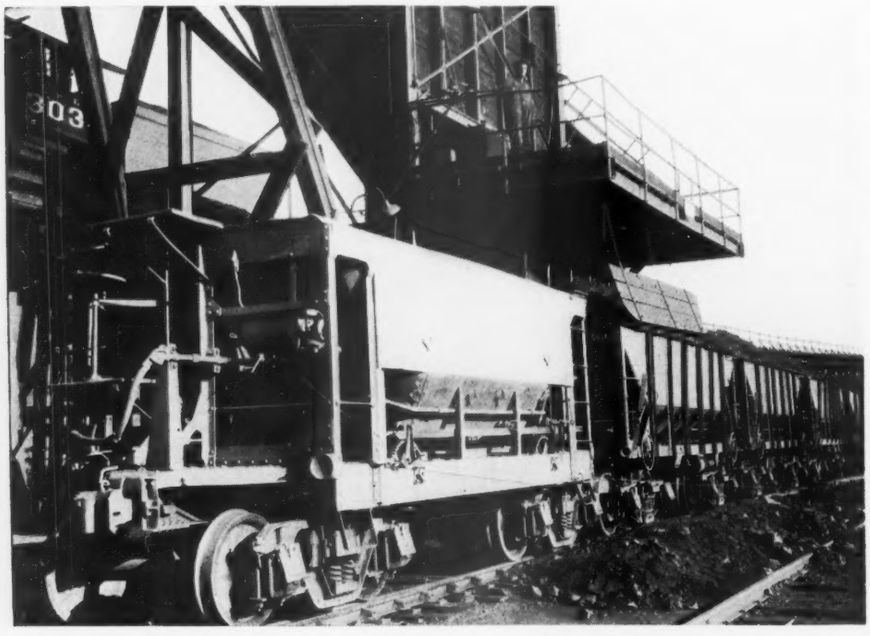
Surveys have already been made for the railroad and over twenty rights of way have been secured.

A Los Angeles contractor with several assistants had a number of holes drilled by means of diamond drills to discover the amount and quality of the cement ore. The drilling operations did not continue as long as was expected, due to the fact that it was discovered that the cement rock was there, and not only that, but that the samples were of an excellent grade, it is stated. It is claimed by residents in that section of the county and others familiar with the formation of the country, that there is an unlimited supply of rock.—*Stockton* (Calif.) *Record.*

Hints and Helps for Superintendents

Car Loading and Car Moving Helps on the Missaba

FOR one man to load 200 standard-gage, 50-ton ore cars in eight hours and in doing this to spot his own cars, start the empties toward his loading apron, load, get the loaded cars off and finally stop the loads at some designated distant point, looks like a large order for one man. At Hibbing, Minn., on the Missaba iron range, where extremely large tonnages are handled daily and where the ore producers' executives hire some of the best in the engineering profession, it is not to be wondered at that this district has developed many methods and devices for handling large tonnages, easily and cheaply. In this district, the Dorr washer and the chain grizzly, two machines that are coming into more general use in the rock products industry, were first developed.



The cars are stopped by compressed air from the plant's compressor

The bin, shown in the cut is supplied with crushed iron ore by a 48-in. belt conveyor, is of comparatively small capacity and is used only as a storage for the few seconds necessary to shift the loads and bring up another empty for loading.

The platform on which the operator stands has, for the most part, a board floor, the level of which is made of open steel floor treads of the Kerlow type. This floor makes it possible for the loader to see the condition of the car being loaded without having to go to the rail and look over the edge. There are three chutes spaced so as to serve one 50-ton ore car of the type shown, and each gate is controlled by a hand operated, swinging cut-off, quadrant gate, so that the car can be completely filled without shifting.

The empties are spotted above the loading bins in trains of from 20 to 30 cars each, all coupled together and with Westinghouse air hose connections properly made as well. On the farthest car in the string, a long ¾-in. air hose is connected to the air brake hose, as shown in the cut, and this air hose connects with a set of Westinghouse air controls mounted on the railing near the operator. Compressed air is supplied to the controls from the plant compressor.

The track has a slope of 8 in. per 100 ft., which is just grade enough for the loads to run away from the loading apron when given a start by the little tugger air hoist that rests on the ground near the third from the last car, the pulley line being attached to the last car. When the car on the spot is loaded, the operator releases the air brakes, gives the air to the little tugger and when the whole string of cars have moved a sufficient distance, he applies the air brake to all the cars in the string and they stop with a suddenness that would gladden the heart of any operator who has chased a loaded car down the track with a chunk of wood in his hand trying to stop that unruly car.

The splatter board is used as shown and is a necessity here, as the cars are loaded to their maximum capacity, since the superintendent wants tonnage, not carloads.

Titrometric Analysis of $CaCO_3$ and $MgCO_3$ in Limestone

AN alcoholic solution of trinitrobenzene is used to tell when the hydroxyl-ion concentration becomes great enough to indicate that all the magnesium has been precipitated. Trinitrobenzene gives a distinct color, at room temperature, in the absence of organic solvent, in saturated calcium hydroxide solution, and none in saturated magnesium hydroxide solution.

The method may be used for the determination of the calcium and magnesium present as carbonates in limestone, dolomite, or magnesite, or part of the procedure may be used to determine magnesium in the presence of soluble calcium compounds. The carbonate is dissolved in a measured portion of standard acid, in excess, the carbon dioxide boiled out, and the excess acid determined by titrating back with standard alkali, bromothymol blue being used as an indicator for neutrality. The difference is the amount of acid required to dissolve the carbonates. Magnesium hydroxide, being much less soluble than calcium hydroxide, is then precipitated from the reaction mixture, to which trinitrobenzene has been added. The precipitation is brought about by the addition of standard alkali, a dark brick-red color of trinitrobenzene indicating the end point. The solution need not be heated, nor is it necessary to add some organic solvent to decrease the solubility of magnesium hydroxide. The excess alkali used, or that required to make the solution strongly enough alkaline to give the color with the indicator, is determined in each case by comparison with a blank test.

Procedure

To the dry, finely pulverized sample (0.5 gram) in an 125-cc. Erlenmeyer flask or a small beaker, pipet 50 cc. of 0.25 *N* hydrochloric acid. Cover the container with a watch glass to prevent loss from spattering. Allow to stand still till the reaction slows up somewhat and then place on a water bath at 70-80 deg. C. till the reaction apparently has ceased. Then heat to boiling point for 1 minute. Cool and wash down the sides of the container with a little water. Add 1 cc. of 0.04 per cent alcoholic solution of bromothymol blue, and titrate with 0.25 *N* sodium hydroxide to the appearance of a blue color (B_1). Add 1 cc. of a saturated alcoholic solution of trinitrobenzene for every 10 cc. of solution, and titrate to a dark brick-red color (B_2) with the sodium hydroxide solution used above, stirring well when the end point is near. To another container of the same size add the same amount of bromothymol blue and trinitrobenzene that was used in the

limestone solution and dilute with distilled water until the volumes of the two solutions are equal. From another burette add 0.25 *N* sodium hydroxide solution (B_3) until the same depth of color is obtained as in the limestone solution. As the brick-red color of the alkaline solution fades readily this test must be run immediately with every sample.

Calculation of Results

The corrected volume of base ($B_2 - B_3$) represents the amount required to precipitate the magnesium hydroxide from a neutral solution, or

$$(B_2 - B_3) \times 0.25 \times 0.02016 = \text{grams MgO}$$

The acid ($50 - B_1$) required to dissolve the sample reacted with both calcium and magnesium carbonates. Therefore, since it takes the same number of equivalents of base to precipitate the magnesium hydroxide as it does of acid to dissolve the magnesium carbonate

$$(50 - B_1 - B_2 + B_3) \times 0.25 \times 0.02804 = \text{grams CaO}$$

This method gives results which check satisfactorily with data obtained by recognized procedure.—*Industrial and Engineering Chemistry* (April, 1928.)

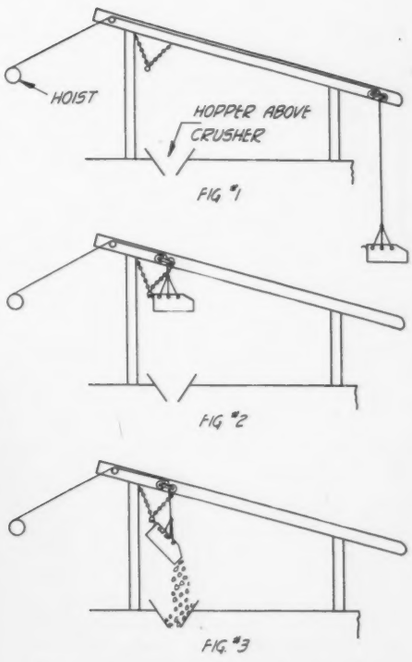
Solution of an Unusual Hoisting Problem

AT the plant of the Manegold Stone Co., Milwaukee, Wis., the rock in the quarry is loaded by hand into rectangular pans holding two tons each. These pans are hauled on four-wheeled trucks from the muck pile to the foot of the quarry bluff opposite the plant and at this point the loaders hook the pans to the cable lift line by a suitable sling and the pans are hoisted vertically, leaving the trucks on the quarry floor. The rock is raised until it comes to the inclined superstructure between plant and quarry bluff. This wood superstructure acts as a support for a hay-carrier-type carriage which, when the load has gone as high vertically as is possible, takes the load up the incline and carries it to a point directly over the crusher.

Above the crusher, and at the same elevation as the hooks on the body of the pan (when the pan is in dumping position), hangs a horizontal bar of 4-in. pipe supported from four points by chains. This bar is parallel to the axles of the carriers but not in the same plane, as it hangs considerably below the sheave carriers.

Pans used for hoisting rock are loaded by hand

The motor-driven drum hoist sets back at a convenient point and the operator by means of the hoist pulls the pan load of rock to the horizontal bar, where the hook on the pan engages with the 4-in. pipe. After this the load line is slacked, causing the pan to tilt forward, dumping the rock to the crusher below. When the pan is empty the operation is reversed, the pan unhooks itself and slacking the line sends the pan on its way back to the quarry.



Progressive operations involved in dumping rock at Manegold plant, Milwaukee, Wis.

The entire mechanism was developed by W. R. Manegold, president of the company, and is a simple, efficient, cheaply constructed device successfully solving a hoisting problem having unusual conditions. The hoist handles 600 yd. of rock in a 10-hour day.

The stone is hoisted vertically to plant above

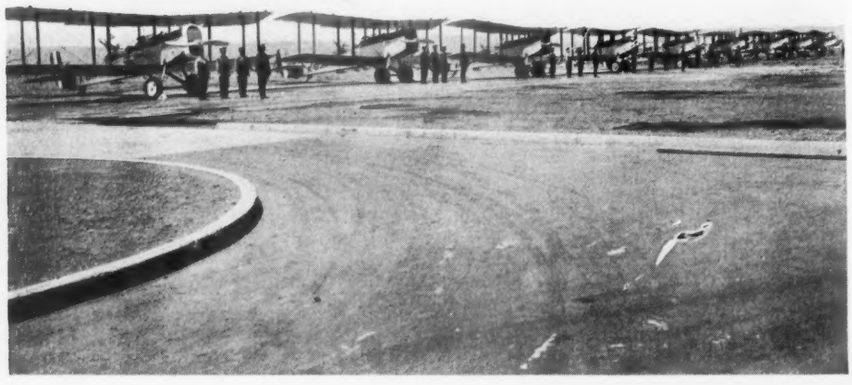
Pan load of rock about to be dumped to crusher

Rock Products for Approved "AAA" Airports

Marines and Navy Take Leadership in Use of Cement and Aggregates for Airport Projects

By G. K. Spencer
(A Commercial Aviator)
Oakland, Calif.

WITH THE DEVELOPMENT of the new, and thus far the finest, "triple A" airport at San Diego, Calif., and the adoption of concrete calling for large quantities of cement, sand, gravel and crushed stone for hangars, runways and takeoff runs, the institution of rock products as standard for all first-class airports has been firmly established. Though the United States Navy, which maintains a vast establishment at San Diego, had some influence in this decision as to the use of rock products, yet it was probably the numerous commercial pilots frequently visiting that port that had the greater influence.



New concrete streets for aircraft are laid at the Naval Air Station, San Diego, Calif.

The Naval Air Station at San Diego was taken as more or less of a guide, and that station is exclusively constructed of concrete and gravel, except for hangars and administration buildings. All marine runways, for instance, down which the large flying boats glide into the beach water, are of concrete. During the construction of the station 100,000 bbl. of cement alone were quickly utilized, and when the new commercial airport at San Diego is complete it will not come far short of a similar absorption of cement and allied products. The work is so extensive that the best estimates place its completion at no less than a year ahead. A number of contractors in the Southwest will have worked on the project during the course of its development.

Following the experience had with concrete landing and launching runways on the Naval Air Station, the Naval authorities decided to utilize concrete in all Naval works at the Naval operating base. The result was, inasmuch as the Naval Operating Base is the foremost industry at San Diego, that the architecture of the whole city, industrially speaking, had to more or less follow the Navy's lead, and this is the principal reason why the visitor to the place is struck most of all by the immense amount of concrete on every hand. In fact, San Diego uses a greater amount of cement per capita than any other city in the West.

The latest Naval development occurred practically alongside the new commercial airport. It was the construction of a 500-ft. concrete pier. Another is to be under construction in the near future. San Diego followed with plans to alter the municipal pier to a similar structure, and then with her airport, also to be largely of concrete.

During the three-year period ended November 30, San Diego, including the Navy, absorbed more cement and crushed stone than the cities of San Francisco and Los

Naval hangar with concrete floor extending out to the flying field

Angeles combined! But it was a case of Naval and industrial development rather than the construction of commercial and resident structures as at the two latter cities.

The San Diego airport is following the best Naval experience with concrete. Among the first airports constructed exclusively with rock products were the Navy ports. The Navy has in existence at Quantico and San Diego ideal ports made with cement and crushed stone 13 years ago—without a single necessary repair to the surfacings in that time. This is considered a better record of economy than could be had with any other possible structural material. Following these two stations, there came into existence extensive concrete work for Naval aircraft at Anacostia, Philadelphia, Pensacola, the Canal Zone, Hawaii, and the Philippine Islands.

These structures were available for inspection at any time civil engineers representing municipalities intending to create airports desired to look at them and test them. The result has, of course, in view of the economy record of the Navy, appealed to most American cities, so that as this is written practically complete concrete airports either have been constructed or are being constructed at St. Louis, New York, Los Angeles, Oakland, Denver, St. Paul, Philadelphia, New Orleans, Atlanta, Cleveland, Pittsburgh, Kansas City and Boston, with many others dallying with the idea.

Concrete Most Satisfactory

There is no more suitable material in existence than concrete for the main base of an airport. It provides the possibility of durable runways with good draining. Most ports adopt concrete for the main centers, with crushed stone or gravel for the landing and taking-off runways. Gravel or crushed stone to a depth of 2 ft., treated with oil to allay dust, is the base of practically every "AAA" airport in the country at the present time. A good turf may be the ideal landing or taking-off runway, but it becomes a liability when faced with intensive traffic, which soon ruins its good qualities for the individual plane.

The general acceptance of concrete has now extended to the flooring of aircraft factories. Fire control, of course, has its place in the scheme of things so far as such floors are concerned, but durability and utility are also features. There is so much that is inflammable in an aircraft factory that concrete flooring, brick walls and metal roofing seem to afford the best structural layout for such factories. Insurance companies, of course, have a share in this kind of construction with their allowance of lower rates.

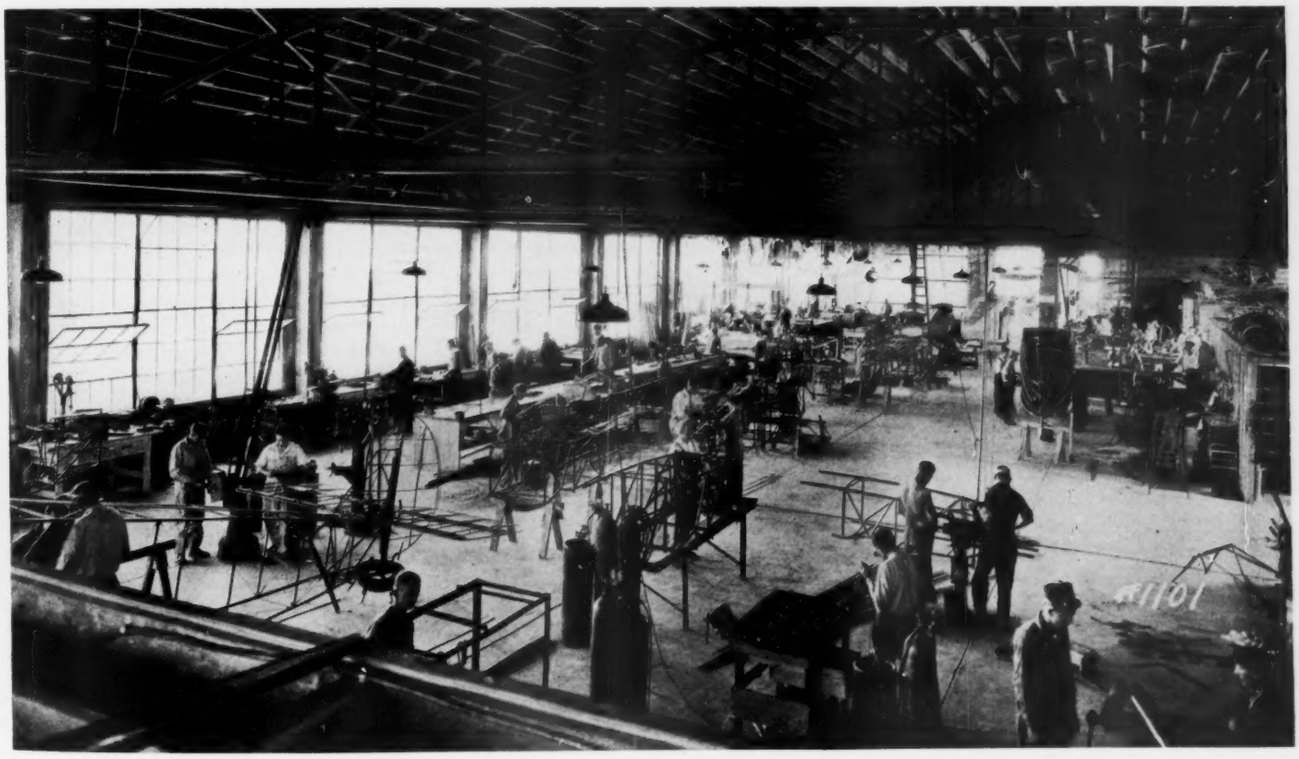
It has, however, been found by the Travel Air Manufacturing Co., at Wichita, Kan., that concrete floors prove 30% more economical than any other type of flooring over a period of five years, and that, collectively, it can be easier heated during the winter, when the company's business is heavy, in creating aircraft for the western and southern dealers.

Quite apart from the value of rock products in interior structures, however, is the extreme value of crushed rock or gravel as an airport surfacing completely covering the port. Many producers are finding some of their most lucrative business supplying airports with necessary aggregate. For several years this field will be in rapid expansion in even the smallest cities and towns. What occurs after that is dependent on aviation's rise.

British Crushed-Stone Production

THE PRODUCTION during 1927 of 13,040,000 tons of natural roadstone from the quarries in Great Britain is revealed in the seventh annual report of the Secretary of Mines for the year ending December 31, 1927. This figure shows an increase of over a million tons over that of 1926 when 12,029,605 tons were produced.

Discussing the report with a representative of *The Contract Journal*, an official of the National Federation of Granite and Roadstone Quarry Owners stated that the large increase in production might be put down to the fact that many engineers who had been conducting exhaustive experiments in the use of other materials had now returned to the use of natural stone on the roads under their control. Of the 200,000 miles of roads in Great Britain, the vast majority are constructed with natural stone and this material is also used with asphalt and as an aggregate for concrete. It is estimated that the British roadstone industry employs upwards of 26,000 workmen.—*The Contract Journal* (London, England).



Cement flooring has proved its worth at the plant of the Travel Air Manufacturing Co., one of the country's leading aircraft manufacturers

Foreign Abstracts and Patent Review

German Kiln Commission Secures Operating Data on Four More Cement Kilns. The kiln committee of the Association of German Cement Manufacturers has tested four more kilns since early in 1927: (1) The automatic shaft kiln is 12-m. (39 ft.) high and 2.6 m. (8.5 ft.) in diameter and equipped with a Gruebe stoker, sheet plate mantle and an air-cooling mantle through which the intake air had been forced. Now the air is being passed into the open and by varying its volume, nearly all deposits are eliminated, any deposits made being removed by simply varying the volume of cooling air. The waste gas temperature fluctuated between 80 and 250 deg. C. (176 and 482 deg. F.). The average content of the flue gases was 22.6% CO_2, 2.05% O and only 0.5% CO, which indicates a uniform distribution of the intake air. In the 36-hour test period there was burned 71,364 kg. (157,328 lb.) of clinker, requiring 12,750 kg. (28,112 lb.) of wet or 12,010 kg. (26,481 lb.) of dry coal, amounting to a consumption of 17.9% of wet coal. With 11.79% of volatile particles, the coal contained 10.72% of ash, and had a heating value of 7,134 W. E. (12,841 B.t.u.), so that 120,059 W. E. (480,236 B.t.u.) were used for 100 kg. (220 lb.) of clinker. This automatic shaft kiln handled 0.748 metric ton (1,649 lb.) per cu. m. (35.3 cu. ft.) of kiln volume exclusive of wall work. (2) The calcining kiln (a rotary kiln with calcining zones) had been tested once before, after which it was equipped with a waste-gas boiler to utilize the high waste-gas temperatures. The kiln is 30-m. (98 ft.) long and 2 m. (6.6 ft.) in diameter at the narrowest section with a built-in calcining zone 10.7 m. (35 ft.) long and 3.4 m. (11 ft.) in diameter; it is equipped with a Garbe boiler of 400 sq. m. (4,306 sq. ft.) heating surface, a superheater of 90 sq. m. (969 sq. ft.) heating surface and a smooth tube economizer of 209 sq. m. (2,250 sq. ft.) surface. The coal analyses showed 1.25% water, 10.89% ash, 18.36% volatile, and a heating value of 7,306 W. E. (13,151 B.t.u.). During the 30-hour test period 106,600 kg. (235,051 lb.) of clinker were burned, amounting to 0.815 metric ton (1,797 lb.) per cu. m. (35.3 cu. ft.) of inside kiln volume in 24 hours. Per 100 kg. (220 lb.) of clinker, 164,049 W. E. (656,196 B.t.u.) of heat were required, of which 97,409 W. E. (389,636 B.t.u.) was used, 66,640 W. E. (266,760 B.t.u.) having been reclaimed by the waste heat installation, which amounts to 40.62%, an exceptionally favorable result. The heat used for 100 kg. (220 lb.) of clinker was less than half of what was used in a wet-process kiln without utilization of waste heat. Operation was maintained with a carbonic acid content of 26.85%. (3) The wet process rotary kiln is 50-m. (164 ft.) long and 2.7 m. (89 ft.) in diameter. The raw slurry is prepared of clay and chalk, contains on the average 40.5% water and 76.6% $CaCO_3$. The coal analyses showed 9.42% ash, 31.45% liquid contents and a heating value of 7,087 W. E. (12,757 B.t.u.). In the 36-hour test period, 298,032 kg. (657,000 lb.) of clinker was burned. Per 100 kg. (220 lb.) of clinker 228,761 W. E. (915,044 B.t.u.) were used. The exit temperature was on the average 551 deg. C. (1024 deg. F.), and the average carbonic acid content 23.8%. Per cu. m. (35.3 cu. ft.) of inside kiln volume (25 cm. or 10 in. deducted for lining) the output was 1.045 metric tons per cu. m. (65 lb. per cu. ft.) in 24 hours. (4) A rotary kiln 30 m. (98 ft.) long and with a sheet plate mantle 2.2 m. (7.2 ft.) in diameter was equipped with an air heater of 430 sq. m. (4,628 sq. ft.) surface area to utilize the waste heat. The raw material was prepared from blast furnace slag and limestone. The clinker was supplied with 2% gypsum ground separately to secure operating figures. The weight of the bagged cement tallied to 0.1% (88,000 kg. instead of 88,090 kg.) with the absolutely accurate clinker weight obtained with the decimal scale. Based upon the absolutely accurate calculations determined with the scale, 88,000 kg. (194,007 lb.) of clinker was burned in the 22-hr., 40-min. test period, which is 93,175 kg. (205,420 lb.) per 24 hours and 1.37 metric ton per cu. m. (85.5 lb. per cu. ft.) of kiln volume, deducting 25 cm. (10 in.) for wall thickness. The raw material had been partly de-acidified, there being 26% carbonic acid as compared to 33% in normal raw material. The kiln rotated once every 25 seconds; such a high speed can be used only when the raw material consists partly of blast furnace slag, which sinters at a considerably lower temperature than ordinary raw materials. In the tests on all the kilns, the differences in the sintering temperature of the raw materials were not considered. In this kiln, a mixture of semi-poo[illegible]d semi-rich coal (volatile contents of the mixture being 16.54%), was used. For the burned quantity of 88,000 kg. (194,007 lb.) of clinker the kiln required 15,000 kg. (33,069 lb.) of wet coal or 14,685 kg. (32,375 lb.) of dry coal. This is a coal consumption of 15,882 kg. (35,013 lb.) of wet coal or 15,548.5 kg. (34,278 lb.) of coal for 24 hours. The heating value was 7,120 W. E. (12,816 B.t.u.). Therefore 118,761 W. E. (475,044 B.t.u.) were used for 100 kg. (220 lb.) of clinker, which is 16.68 parts of coal for 100 parts of clinker, in which case again the raw powder is partly de-acidified. The cold air was passed through an insulated pipe line to the kiln head and heated with the air preheater from 18 deg. C. (64.4 deg. F.) to 376.3 deg. C. (710 deg. F.) for combustion service, and thereby the flue gases cooled from 590 deg. C. to 290 deg. C. (1094 deg. F. to 554 deg. F.). Without the air preheater 136,684 W. E. per 100 kg. (546,736 B.t.u. per 220 lb.) of clinker would have had to be used, so that instead of 16.68% of coal it would have been 19.2%. Thus the air preheater reclaimed 16,500,000 W. E. (66,600,000 B.t.u.) or 13% of the waste heat. The clinker heat was utilized for drying the coal by drawing it from the cooling drum and forcing it into the coal drying drum. This heat was not included in the above calculations.—*Tonindustrie-Zeitung,* (1928) **52**, 42, 850-852.

Discharge Funnel for Shaft Kilns, Especially Lime Shaft Kilns. The discharge end of shaft kilns is designed in funnel shape and the discharge opening is made as small as possible, in order to be able to attain easily an air-tight closure. The operation is with air pressure. The moving down of the charge in the shaft and in the funnel in which a quick change takes place from the full width shaft to the narrow discharge cross-section, and the discharge through the narrowed opening do not take place in the order required for the combustion process, since the upper layers of fuel, which are not yet burned, advance in the center and become mixed with the lower layers which are already burned. Furthermore, the entire load of the charge in the shaft rests upon the discharge funnel, so that the material pinches in the funnel. In order to avoid these drawbacks, guiding plates have been provided, according to the invention, in the shaft discharge funnel, which lead approximately from its axis in stream shape and at an incline, and are flat or curved, reaching from the intake cross-section downward against the discharge opening of the funnel. In this way the material discharging from the shaft is divided into individual streams and is guided to the exterior without displacement in the shaft and pinching in the opening of the discharge funnel. At the same time the discharge funnel is relieved in part from the load of the charge above it in the shaft.—*German Reich Patent* No. 451,403.

New Insulating Materials. In a presentation before the technical congress of the French ceramic industry concerning insulating materials for the ceramic industry, the cellular concrete and the "Alfol" were mentioned as promising new insulating materials. The cellular concrete of the Danish firm Christiani and Nilsen consists of a mixture of potassium-soap foam or potassium-lather

and very liquid portland cement milk, which is mixed for four to five minutes in a concrete mixer and then cast into forms which set and harden in three weeks. The cement encloses the soap bubbles and there remains a light material simulating pumice, which weighs 250 to 800 kg. per cu. m. (15.6 to 49.9 lb. per cu. ft.), depending on the mixing proportion. The cellular concrete is a very poor heat conductor and may be exposed to temperatures up to 900 deg. C. (1652 deg. F.).—*La Ceramique* No. 484, July (1928), pp. 138-143.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Process of Producing Calcium Aluminate Cement. Mixtues of bauxite and calcareous materials employed for the manufacture of aluminous cements, generally melt at a temperature very close to their point of softening or clinkering.

The process consists in heating an alumino-calcareous mixture, suitably proportioned, to a low temperature during a long period; a temperature of 900 to 1000 deg. C. and a duration of 9 to 12 hours appears to give the best results.

Starting with a finely ground mixture of 33% fat lime and 67% of bauxite, this, when perfectly uniform, is watered and agglomerated into briquettes of ordinary dimensions; these briquettes after drying are burned at 900 deg. C. in a continuous lime kiln with natural draught, for from 9 to 12 hours.

The fritted material, obtained on withdrawal from the kiln, after grinding, yields a cement which, even after only 24 hours, presents a very high resistance, its strength continuing to increase with the lapse of time. Its duration of setting varies between 6 and 8 hours. This cement, immersed in sulphated solutions or in pure water, does not undergo any deformation.

The burning can be effected in any suitable kind of kiln; briquetting can be avoided by employing a rotating furnace. The composition of the calcareous bauxite or lime-bauxite mixture can be varied.—*Emile Marcel Roche, assignor to Urbain Bellony Voisin.* U. S. Patent No. 1,689,891.

Method of Producing Phosphorus Chloride. Heretofore it has been common practice to produce phosphorus chlorides by treating phosphate rock with sodium chloride. The reaction by which the phosphorus chloride has been produced is as follows:

$$Ca_3(PO_4)_2+10NaCl=3CaO+5Na_2O+2PCl_5$$

The patentee has discovered that phosphorus sulphide may be produced from phosphate rock and sodium sulphide as follows:

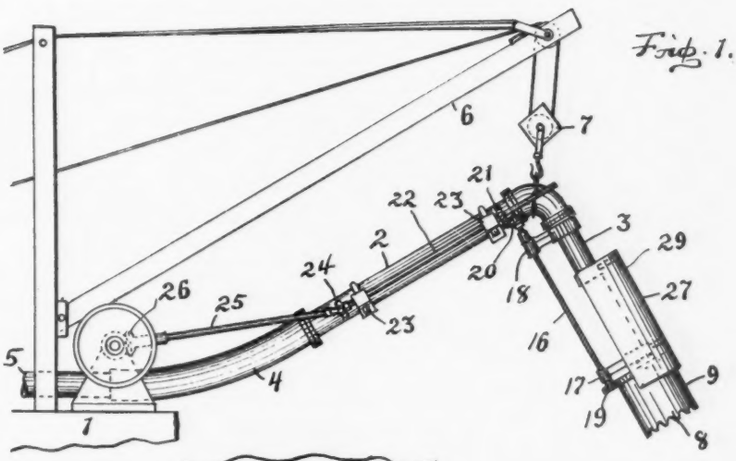
$$Ca_3(PO_4)_2+5Na_2S=3CaO+5Na_2O+P_2S_5$$

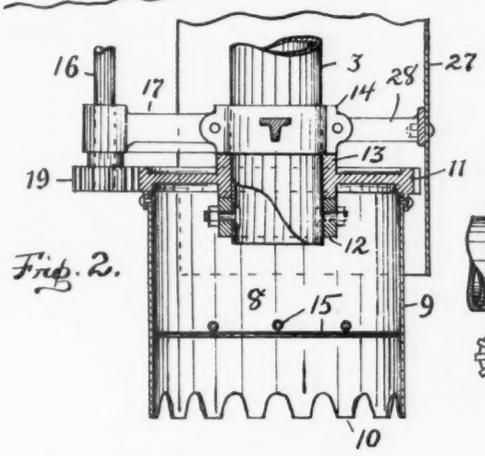
He has also discovered that silica can be used in the first reaction and in the one that follows to produce a fusible slag and to eliminate solid residues that usually form. The silica also serves to prevent a portion of the sodium oxide becoming volatalized and passing over with the phosphorus chloride and to assist in freeing the phosphorus pentoxide (P_2O_5) from the phosphate rock by forming an intermediate compound at a reduced temperature in which the compounds of P_2O_5 are loosely held and from which they are readily liberated by additional heat. The patentee further claims that the presence of the silica materially reduces the thermal energy otherwise required for the operation. The temperature of reaction ranges from 1100 deg. C. to 1440 deg. C.

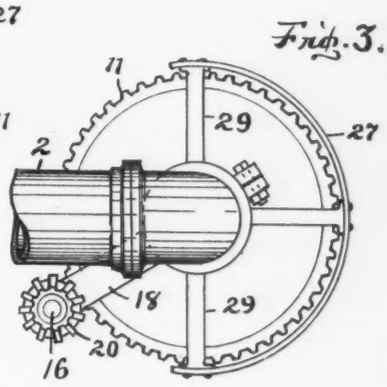
The reaction is:

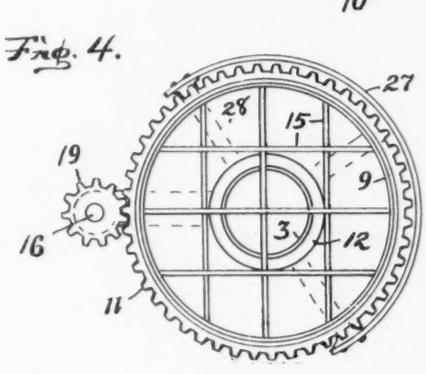
$$Ca_3(PO_4)_2+8SiO_2+10NaCl$$
$$2PCl_5+3CaSiO_3\cdot 5Na_2SiO_3$$

The reactions by the use of silica are conducted at a considerable fuel saving.—*Claude G. Miner,* U. S. Patent No. 1,688,503.









Details of cutter head for dredge suction

Cutter Head for Dredge. The suction pipe of the dredge terminates in a cylinder with a toothed lower edge. This cylinder is about three times the diameter of the pipe, in the drawings for the patent, and it is arranged to be revolved by rods and gearing, driven by a motor on the dredge. When it is revolved the teeth cut into the sand and gravel and loosen it so that it can be easily lifted by the suction of the dredge pump. Bars across the lower end of the cylinder keep cut stones too large to pass through the pump. The upper end of the cylinder is closed. A shield keeps sand and gravel from falling on the gearing that drives the cylinder when the bank caves.—*Willis E. Groh,* October 2, 1928. Patent No. 1,686,321.

Work Under Way on New Texas Mill of Atlas Company

EXCAVATIONS for the mill building at the Atlas Portland Cement Co. plant near Waco, Texas, began the last week in November, and with the letting of contracts for crushers, dryers, kilns, grinding-mills, cement and rock-storage silos already made, progress on the Waco plant is fully up to schedule, according to John R. Morron, president of the cement company.

"Foundations for a storehouse, machine shop and office building are already under way, and we are also excavating for cement storage and rock storage," Mr. Morron declared. Lines are being laid by the Texas Power and Light Co. to the plant, and the new plant should be completely equipped with service from the local plant inside of three weeks.

Railroad trackage serving the cement plant is complete, and the erection of a 200,000-gal. water tank is now under way following the completion of a 55,000-bbl. oil tank.—*Waco* (Texas) *News-Tribune.*

Proposed Cement Plant Arouses Southern California

THE PROPOSAL several months ago of the Santa Monica Mountain Park Co., Alphonso E. Bell, president, to build a cement plant at San Ynez Canyon close to the fashionable residential district of Beverley Hills, raised so much protest from the press and local civic bodies that the cement company withdrew the proposal.

On November 26 the directors of the cement company met the Santa Monica Ocean Park Chamber of Commerce and presented a proposal to establish a quarry and pulverizing plant at the proposed quarry site, and by means of an 8-in. pipe pump the finely ground limestone to the Santa Monica bay, where barges would receive the material and haul it to San Pedro, where the cement company proposed to build the plant. The second proposal caused another outburst of criticism, mostly unfavorable, from the press of southern California.

The *Venice* (Calif.) *Vanguard* quotes as follows:

"It would be a fine thing for Santa Monica," declared Commissioner Frank Helton, who recently visited the plant in Birmingham, Ala., from which the proposed Santa Monica bay district plant would be modeled. Mr. Helton declared that at the Birmingham plant there was no noise, dust, smoke or annoyances of any kind. Laundry hung on a line within less than a hundred feet from the plant, and in the way of the prevailing winds, did not suffer in the slightest, he stated. Flowers and gardens flourished in the yards of the mill, he stated.

At a special committee meeting of the Santa Monica Ocean Park Chamber of Commerce, held December 7, Milton D. Gardner, representing the Bell interests, the first speaker, asserted that the opponents of the project had purposely "beclouded the issue by giving publicity to the untrue statements that a cement plant was contemplated in the revised policy of mining and quarrying the limestone." Mr. Gardner outlined the plan as submitted by Mr. Bell and Mr. Traylor, an associate, at a meeting of the chamber of commerce some weeks ago.

Distortion Charged

"In spite of our clear-cut plans, the misrepresentation and distortion of facts and spreading statements that are misstatements goes on by the enemies of our project," asserted Mr. Gardner.

"As we have pointed out time and again, the nearest residence is two miles away and the nearest community is approximately three and a quarter miles distant.

"These distances have been carefully computed and we defy any man to prove them incorrect."

On the other hand the *Los Angeles Examiner* published a two-column bold faced display editorial as follows:

"Let's Put Permanent Quietus on This Cement Project.—The city had good reason to disapprove the proposition of the Mountain Park Co. to operate a cement plant in Santa Ynez Canyon when that matter was being promoted last spring.

"Precisely the same reason why this nuisance should not be permitted exists today.

"The slightly changed proposal now submitted by this commercial group should deceive no one; the fact remains that it's to be a cement plant and no amount of sugar-coating will save it from being obnoxious and intolerable.

"The bay and mountains that make up the Santa Monica district are a very rare heritage of beauty to this region. The city of Santa Monica wisely protects the ocean front from buildings and other features that would be objectionable.

"This enlightened policy should be emulated by Los Angeles, which has municipal control over many square miles of the choicest land in that area.

"To permit an industry to operate in this purely residential section would be an outrage. There is absolutely no justification for such a project.

"That statement would apply if the cement plant were the only thing of its kind contemplated. That it would be the entering wedge for other industries is something that can be predicted with certainty. Once let this business get a foothold and it's good-by to the Santa Monica Mountains as a residential and scenic territory.

"Let's keep these hill lands forever beautiful, permitting no spoilation or detraction. They are among our priceless assets.

"Let's declare a policy with regard to this cement plant scheme that will settle for all time the status of this and similar areas, setting them aside in perpetuity for residential and other equally high-class development.

"Fine residential districts must be protected, particularly in those parts where occurs the magical combination of mountains and sea. The Santa Monica Bay setting is unequaled. Here it is possible to carry out a home-building program that will make this the most charming and attractive zone to be found anywhere.

"It's important and imperative that there should be no industrial invasion of our beauty spots."

The Santa Monica Bay Council went on record opposing the project, and in company with many other civic bodies filed protest with Major C. P. Gross, U. S. District Engineer, Secretary of the Navy Wilbur, and the City Planning Commission of Los Angeles. Attorney Frank P. Doherty, representing the home owners in the Pacific Palisades, went on record as opposing the project, as did the Pacific Palisades Protective Association, Brentwood Chamber of Commerce, Pacific Palisades Protective Committee, Hollywood moving picture interests led by Arthur Brown, Councilman F. L. Shaw of the City of Los Angeles, and thousands of individual protests.

The hearing before Major Gross, which was set for December 11, was postponed in order to give the opponents more time to file protests.

Rock Products Article Much Discussed

THE ARTICLE of Dr. Eles which was published in Rock Products November 10, captioned "A $5,000 Reward," has been the subject of much newspaper comment, and judging from the large number of clippings we have received, the announcement has had much publicity. Notably among these clippings was that published by the *Wenatchee* (Wash.) *World,* which states that the high point of the address by C. W. Smith at the annual convention of the Central Washington Mining Council dealt with this reward offered by Dr. Eles for a dolomite of described characteristics as being an example of the interest that is being taken in the rock products industries.

Another feature of interest in connection with the convention, according to this report, was the attendance of several representatives of large timber companies operating in the northwest which, having vast acreages of logged-off timber land, hoped to get a slant on the nonmetallic industry, as they have discovered several valuable minerals on these logged-off areas.

Editorial Comment

Concrete Paving Design

When a concrete bridge fails it is a disaster; when a concrete highway fails it is only a crack in the road to be repaired. But many cracks cause the whole road to be looked upon as a failure and an effort is made to fix the blame. If the subgrade conditions were obviously not too bad, it used to be the cement that got the "credit." But now the public has been educated to the knowledge that portland cement is standardized and the particular aggregate used is apt to get the blame.

It is undeniable that there are differences in aggregates, but any concrete engineer who knows his business knows how to make good concrete from any or all of them. Practically all of our roads *are* of good concrete. A study of 2200 drill cores from Maryland highways, from one to 11 years old, showed an average strength of 4079 lb. in compression, and other states would probably show just as good a record. The Maryland highways were made with eight different aggregates and the strength differences between aggregates were less than the differences between adjacent portions of the same slab, supposedly of identical concrete.

It seems fair to ask if too much stress has not been placed on materials and not enough on design and technique of construction. Any highway engineer will admit that he designs as close to the limit as he can, allowing little margin for safety. His figures show that he does, and this was the whole point of A. T. Goldbeck's analysis of the New Jersey concrete road tests. He does so because he wants the money available to go as far as it can, the demand for concrete highways is so insistent. And if the paving does fail it is not a calamity; it is only a crack in the road.

Results seem to have justified this practice for the public is generally satisfied with its concrete roads and wants a lot more of them. It is only the occasional road that cracks badly. But when much cracking appears, in fairness to the producers of materials there should be less readiness to place the blame on the particular aggregate or other material used. With the designed strength so close to what the pavement must bear from ordinary traffic, other factors may cause cracking. For example, Prof. Davis, as he reported at the June A.S.T.M. meeting, found that wet concrete heated to the temperature that a pavement might reach after a summer shower, lost 20.5% of its strength. And studies of repeated impact have brought out the influence of factors that are not always taken into account in design. Concrete highway materials are generally better than specifications demand and the blame for a cracked road should not be laid to them without a thorough consideration of the design and other factors besides materials that affect concrete strength.

The Maiden's Prayer, Etc.

Our November 10 issue contained an editorial on the pleasure and advantage resulting from an amateur knowledge and study of geology to rock products operators. We expressed the hope producers would take a scientific interest in investigating the materials of our common Mother Earth as they industrially remove and ship them for the common welfare of mankind, and for their own profit. Apparently as a direct answer to our maidenly prayer a newspaper clipping has come to our desk from Greenville, Ohio, detailing at some length an address to the local Rotary Club on November 17 by F. D. Coppock, president of the American Aggregate Corp., on "The Romance of Gravel." The following extracts are probably a none too accurate report of his talk, but they serve to illustrate our viewpoint:

> The title assigned to the speaker was "The Romance of Gravel" which title he stated might seem not appropriate, as gravel is a cold, hard material subject and one could bring in the idea of romance more readily with sand for reasons which he explained. He discussed the transporting, mining and uses of gravel. In the long night period preceding all life, gravel was really the first mill which produced silt and soil which finally produced vegetable and animal life.
>
> He told of several interesting days with a professor of geology in northern Alabama who explained that coal is a vast compressed mass of vegetation and that Nature's story can be read in the rocks by those competent. He stated the age of the earth varies from twenty-five million to three billion years, a period of time which is absolutely inconceivable to human mind. It is probable that the earth is over a billion years old and the period of human and animal life about one-twentieth of that time. The lava from the volcanoes has hardened into rock, and the process of disintegration has been carried on by heat, cold, erosion and other forces which has taken the movable soil to the sea and towards the tropics.

The point we wish to emphasize is that when a man of Mr. Coppock's calibre in the industry can find time and mental leisure to acquire such knowledge—as a pastime we are sure, in addition to golf and hunting—it should not be difficult for other busy executives to do the same. Moreover, Mr. Coppock has reached the top of the ladder in the sand and gravel business, as president of by far the largest aggregation of sand and gravel plants in the world, from the lowest round; for he takes honest and justifiable pride in the fact that he started in the business with a shovel and a wheelbarrow, and was for a short time both proprietor and labor account at the same time. And now, aside from expert knowledge of the sand and gravel industry he is a positive genius in business of many varieties. Yet with all this busy life he has found time for, and positive pleasure in, an acquisition of such knowledge of geology that he can perceive and discuss the genuine romance of his industry. Lucky and happy man! May there be more like him in our prosaic rock products industry!

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	12-31-28	90	91	
Alpha P. C. new com.	1- 2-29	52½	53½	75c qu. Jan. 15
Alpha P. C. pfd.[2]	12-31-28	116	.....	
American Aggregates com.	1- 2-29	50	51	75c qu. Dec. 1
Amer. Aggregate 6's, bonds	1- 2-29	113	115½	
American Brick Co.	12-17-28	16	17	25c qu. Nov. 1
American Brick Co. pfd.	11-19-28	91	.....	50c qu. Nov. 1
Am. L. & S. 1st 7's[29]	12-31-28	100	102	
American Silica Corp. 6½'s	1- 2-29	96	100	
Arundel Corp. new com.	1- 2-29	42	43¼	50c qu. Jan. 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	12- 5-28	85	90	
Atlas P. C. com.	12-31-28	48	52	50c qu. Dec. 1
Atlas P. C. pfd.	12-31-28	52	60	66⅔c qu. Jan. 2
Beaver P. C. 1st 7's[36]	12-27-28	99	100	
Bessemer L. & C. Class A[4]	12-28-28	36½	37½	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	12-28-28	100	100½	
Bloomington Limestone 6's[29]	12-31-28	94	95	
Boston S. & G. com.¶[16]	12-15-28	80	85	$1 qu. July 2
Boston S. & G. 7% pfd.¶[16]	12-15-28	85	90	1¾% qu. July 2
Boston S. & G. 1st pfd.[16]	1- 1-29	Called at 107½		2% qu. July 2
Canada Cem. com.[43]	12-28-28	31	31½	
Canada Cement pfd.[43]	12-28-28	98½	99	1.62½ qu. Dec. 31
Canada Cement 5½'s	12-28-28	101½	102¼	
Canada Cr. St. Corp. 1st 6½'s	12-28-28	.....	96	
Canada Gyp. & Alabastine	12-18-28	74	75	75c Jan. 2
Certainteed Prod. com.	1- 2-29	28	28⅛	$1 qu. Oct. 1
Certainteed Prod. pfd.	1- 2-29	78	85⅛	1.75 qu. Jan. 1
Cleveland Stone new st'k	12-31 28	77	.....	50c qu. Dec. 1 & 25c ex. 50c qu. March 1
Columbia S. & G. pfd.	12-31-28	91½	93¼	
Consol. Cement 1st 6½'s, A[42]	1- 2-29	94	96	
Consol. Cement 5-yr. notes	1- 2-29	91	95	
Consol. Cement pfd.[29]	12-31-28	60	70	
Consol. S. & G. com. (Canada)	12-28-28	17½	18	
Consol. S. & G. pfd. (Canada)	12-28-28	90	92	1¾% qu. Nov. 15
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	12-31-28	97½	99	
Coosa P. C. 1st 6's[29]	12-31-28	50	55	
Coplay Cem. Mfg. 1st 6's[40]	1- 2-29	90	.....	
Coplay Cem. Mfg. com.[40]	1- 2-29	15	.....	
Coplay Cem. Mfg. pfd.[40]	1- 2-29	75	.....	
Dewey P. C. 6's[35]	1- 2-29	99	102	
Dolese & Shepard[7]	1- 2-29	120	125	$2 qu. Jan. 1
Edison P. C. com.[19]	12-31-28	50c	.....	
Edison P. C. pfd.[19]	12-31-28	1	.....	
Edison P. C. bonds[19]	12-31-28	75	.....	
Giant P. C. com.	12-31-28	37	43	
Giant P. C. pfd.	12-31-28	40	50	3½% Dec. 15
Ideal Cement, new com.	12-29-28	82	85	75c qu. Jan. 2 & 50c ex. Dec. 22
Ideal Cement 5's, 1943	12-29-28	110	112	
Indiana Limestone 6's	1- 2-29	91½	.....	
International Cem. com.	1- 2-29	95	95⅛	$1 qu. Dec. 28
International Cem. bonds 5's	1- 2-29	109¾	110	Semi-ann. int. payable June 15
Iron City S. & G. bonds 6's[46]	12-28-28	97	99	
Kelley Is. L. & T. new st'k	12-31-28	56⅞	.....	62½c qu. & 50c ex. Jan. 2
Ky. Cons. Stone Co. com.[48]	12-28-28	13	15	
Ky. Cons. St. com. Voting Trust Certif.[48]	12-28-28	13	15	
Ky. Cons. Stone 6½'s*[48]	12-28-28	96	100	
Ky. Cons. St. Trustee Certif.[48] (1 sh. 7% cum. pfd. & 1 sh. com. stock)	12-28-28	98½	102	1.75 Nov. 1
Keystone Sand & Sup. 6's[47]	8-22-28	99	100	
Lawrence P. C.[2]	12-31-28	95	100	2% qu. Sept. 29
Lawrence P. C. 5½'s, 1942	12- 7-28	95	97	
Lehigh P. C.[2]	1- 2-29	60½	61	62½c qu. Feb. 1
Lehigh P. C. pfd.[2]	1- 2-29	106¾	108½	1¾% qu. Jan. 1
Lyman-Richey 1st 6's, 1932[18]	12-31-28	98	.....	
Lyman-Richey 1st 6's, 1935[18]	12-31-28	96½	.....	
Marblehead Lime 1st 7's[14]	12-28-28	103	.....	
Marbleh'd Lime 5½'s, notes[14]	12-28-28	98½	100	
Material Service Corp.	1- 2-29	37½	38	
Mich. L. & C. com.[6]	12-31-28	35	.....	
Missouri P. C.	1- 2-29	43	44	50c qu. Aug. 1
Monolith Midwest[9]	12-27-28	8	10	
Monolith P. C. com.[9]	12-27-28	14	14½	8% ann. Jan. 2
Monolith P. C. pfd.[9]	12-27-28	8¾	9¼	
Monolith P. C. units[9]	12-27-28	31½	33	
National Cement 1st 7's[38]	12-29-28	99	101	
National Gypsum A com.†[35]	1- 2-29	12	14	
National Gypsum pfd.[35]	1- 2-29	50	54	1¾% qu. Apr. 1
Nazareth Cem. com.	12-14-28	27	30	75c qu. Apr. 1
Nazareth Cem. pfd.	12-14-28	102	105	
Newaygo P. C. 1st 6½'s[29]	12-31-28	101	.....	
New Eng. Lime 1st 6's[14]	12-28-28	98	100	
N. Y. Trap Rock 1st 6's	12-31-28	100½	.....	
North Amer. Cem. 1st 6½'s	1- 2-29	70	.....	
North Amer. Cem. com.	12-31-28	9	9¼	
North Amer. Cem. 7% pfd.	12-31-28	30	32	1.75 qu. Aug. 1
North Amer. Cem. units	12-31-28	25	30	
North Shore Mat. 1st 5's[18]	1- 2-29	98½	.....	
Northwestern States P. C.[37]	12-29-28	196	208	
Pac. Coast Cem. 6's. A	12-27-28	95	96½	
Pacific P. C. com.	12-29-28	25¾	.....	
Pacific P. C. pfd.	12-27-28	79	80	1.62½ qu. Jan. 5
Pacific P. C. 6's	12-27-28	98	99½	
Peerless Egyp'n P. C. com.[21]	12-31-28	2	3	
Peerless Egyp'n P. C. pfd.[21]	12-31-28	75	85	1¾% qu. July 1
Penn-Dixie Cem. 1st 6's[29]	1- 2-29	94⅜	95	
Penn-Dixie Cem. pfd.[28]	1- 2-29	83	86	1.75 qu. Dec. 15
Penn-Dixie Cem. com.	1- 2-29	21½	21⅞	50c qu. July 1
Penn. Glass Sand Corp. 1st 6's, 1952	12- 7-28	102	103	
Penn. Glass Sand pfd.	12- 7-28	113	118	
Petoskey P. C.	1- 2-29	10	10¼	1½% qu.
Riverside P. C. com.	12-29-28	20	.....	
Riverside P. C. 1st pfd.	12-27-28	95	97	1.50 Aug. 1
Riverside P. C., A	12-27-28	20	21	31¼c cum. par. Aug. 1
Riverside P. C., B	12-27-28	1	2	
Sandusky Cem.	12-31-28	250½	.....	$2 qu. Jan. 1 & $4 extra
Santa Cruz P. C. bonds	12-29-28	105¾	.....	6% annual
Santa Cruz P. C. com.	12-29-28	90	.....	$1 qu. Jan. 1 & $2 ex. Dec. 24
Schumacher Wallboard com.	12-14-28	15½	15¾	50c May 15
Schumacher Wallboard pfd.	12-14-28	.....	25⅞	
Southwestern P. C. units[44]	12-13-28	270	.....	
Superior P. C., A[29]	12-27-28	46½	48	27½c mo. Dec. 1
Superior P. C., B[29]	12-27-28	35	36	
Trinity P. C. units[37]	12-29-28	157	165	
Trinity P. C. com.[37]	12-29-28	55	65	
U. S. Gypsum com.	1- 2-29	71	72	2% qu. Dec. 31
U. S. Gypsum pt. paid	1- 2-29	50	54	
U. S. Gypsum pfd.	1- 2-29	121	.....	1¾% qu. Dec. 31
Universal G. & L. com.[3]	1- 2-29	25c	1	
Universal G. & L. pfd.[3]	1- 2-29	5	10	1½% Feb. 15
Universal G. & L., V.T.C.	1- 2-29	no market		
Universal G. & L. 1st 6's[3]	1- 2-29	50	60	
Chas. Warner com.	12-31-28	40	43	50c qu. Jan. 12 & 50c ex.
Chas. Warner pfd.	12-31-28	109	.....	1¾% qu. Jan. 24
Whitehall Cem. Mfg. com.[38]	12-28-28	150	.....	
Whitehall Cem. Mfg. pfd.[38]	12-28-28	98	.....	
Wisconsin L. & C. 1st 6's[15]	1- 2-29	99½	.....	
Wolverine P. C. com.	1- 2-29	5½	7	15c qu. Nov. 15
Yosemite P. C., A com.[20]	12-27-28	4¾	5¼	

*Ann. interest due May 1 and Nov. 1. Semi-ann. coupon of $32.50 paid Nov. 1. †Natl. Gypsum Class A & B com. holders of record Dec. 27 have right until Jan. 15 to purchase at $10 a share Class A stock for each two shares of Class A or B stock held; payment of 50% is due Jan. 15 and March 15. ¶Com. exch'd. for 5 shs. new com.; 7% pfd. exch'd. for 2 shs. new 7% pfd.

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., Detroit. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Bank of Pittsburgh, Pittsburgh, Pa. [48]E. W. Hays & Co., Louisville, Ky.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Brick Co. pref. (sand-lime brick) 16 sh.[6]	par 25	25¾
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	.....
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
International Portland Cement Co., Ltd., pfd.	30	45
Knickerbocker Lime Co.[4]	105	.....
New England Lime pfd. A (12-17-28)	88	93
New England Lime pfd. B (12-15-28)	95	99
New England Lime com. (12-15-28)	25	30
River Road Sand and Gravel Co.,[9] 200 shares	$21 per share	
River Road Sand and Gravel Co.,[11] 219 shares	$55 per share	

Stock	Price bid	Price asked
Simbroco Stone Co.,[10] 10 sh. pfd., par $50	$10.25 per sh.	
Southern Phosphate Co.[6]	1¼	.....
Universal Gypsum com. free stk.[1] 300 shares	$75 for the lot	.....
Universal Gypsum com.[1] 153 shares (no par)	$51 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....
Winchester Rock Brick Co. pfd., 1 share (par $25) and 1 share com. (par $10)[6]	$8 for the lot	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [8]Auction sales of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [9]Price obtained at auction by Barnes & Lofland, Sept. 26, 1928. [10]Price at auction, June 6, 1928, R. L. Day & Co., Boston, Mass. [11]Price at auction, Nov. 21, 1928, by Barnes & Lofland.

National Gypsum Awarding Rights

THE NATIONAL GYPSUM CO.'S directors have voted to extend to all holders of class A and class B common stocks of record as of December 27, 1928, the right to purchase for $10 a share class A common stock to the amount of one-half their present holdings; that is, one share for each two shares held.

Immediately following December 27 warrants will be issued to each stockholder of record covering these rights, which warrants will contain forms for subscription and assignment. Warrants will be of two kinds, one covering full share rights and the other fractional share rights. The latter will only be accepted in combination with other fractional share rights aggregating full shares. Arrangements have been made with a responsible investment banker to purchase and sell these fractional rights. Detailed instructions covering the entire plan will be included in a letter accompanying the warrants. Rights expire on January 15, 1929.

The proceeds will be used entirely for additional working capital to take care of the rapidly increasing business and maintain the usually large cash reserve which is considered good insurance during the formative period of business.

During the past six months a number of new products have been added on which a larger and more profitable business than anticipated is taking place. Several more will be added by the first of the year and these with the regular lines will add materially to "accounts and receivable and our inventory."

The three plants are in excellent condition and during the year improvements and extensions totaling in excess of a half million dollars have been made.

While there has been no actual improvement in the price situation there is every indication that there will be within the next few months.—*Buffalo* (N. Y.) *Times.*

Predictions Are That Asbestos Corporation Will Not Pass Dividend

THOUGH the market action of the stocks, both preferred and common, of the Asbestos Corp. has reflected the hard times the company has experienced in its mining operations, there seems yet to be no justification for the prediction that the company will pass its preferred dividend. The market seems to indicate that there is a good chance of such action by the management.

Low-grade rock has been encountered, which has made it necessary for the company to handle a larger amount of rock at an increase in cost and a smaller margin of profits. But the management's decision to change the mining methods will certainly work out to their advantage in the course of the next year.

Hitherto the Asbestos Corp. has mined its properties along the old method—that is, from a pit in the form of a "V." In the past year the company has centered its efforts on rounding out the "V" pits into "U." By this method of operation the company will eliminate a lot of waste which will eventually reflect in lower operating costs. Further reductions in costs will be effected when the new mill near the Consolidated Mines, nearing completion, comes into operation.

In addition to this, by the sale of the company's power holdings on Etchemin River to Shawinigan, an annual saving of $200,000 will be effected in power costs.

Canadian Gravel Company Issues Bonds

THE CONSOLIDATED OKA SAND AND GRAVEL CO., Ltd., of Montreal, Que., has issued bonds to the extent of $700,000. It is understood that the offering is already oversubscribed. The company is a consolidation of the Oka Sand and Gravel Co. and the Consolidated Sand Co., both of Montreal. The company owns a large fleet of tugs, dredges, derricks and scows, and its properties include practically all the available sand in commercial quantities within 150 miles of Montreal.

6½% first mortgage sinking fund, 20-year bonds, Series "A." Dated November 1, 1928; due November 1, 1948

Capitalization	Authorized	Issued
6½% first mortgage bonds	$1,000,000	$700,000
7% first preferred stock	1,000,000	700,000
Common stock (no par), shs.	50,000	21,000

(Of the balance of authorized common shares of no par value, 14,000 shares are reserved for the conversion of the preferred stock.)

Company: Handles about 90% of the sand used for building and industrial purposes in Montreal and district.

Properties: Three distributing plants, a fleet of barges, scows, and large deposits of washed sand near Montreal.

Security: Bonds are secured by a first mortgage on fixed assets and floating charge on current assets, the whole totaling $1,767,507.

Earnings: Combined net earnings for 10 months ending October 31, $190,338.

Sinking Fund: Operative 1932, sufficient to retire 65% of the issue by maturity.

Offered: December, 1928, by James Richardson and Sons, Montreal, at par.

Chas. Warner Co. Pays Extra Dividend

THE DIRECTORS of the Charles Warner Co., Wilmington, Del., have declared an extra dividend of 50 cents a share on the common stock and the regular quarterly dividend of 50 cents a share on common and 1¾% on the first and second preferred stocks. The common dividends are payable January 12, and the preferred dividends on January 24, all to holders of record December 31. In each of the two preceding quarters an extra disbursement of 25 cents a share was made on the common stock.

On August 10, 1927, the company paid an extra dividend of 50 cents a share on the common stock.

Northwestern States Cement Increases Capital

HANFORD MacNIDER was elected chairman of the board of directors of the Northwestern States Portland Cement Co. at the annual meeting of stockholders, and W. H. L. McCourtie, Jackson, Mich., who organized the company, was elected president. Other officers are: C. E. Ulrickson, Dallas, Tex., vice-president; G. C. Bagley, treasurer; Peterson Anderson, secretary; and C. A. Hansen, assistant secretary. Stock was increased from 35,000 shares to 140,000 and par reduced from $100 to $25 with a 50% stock dividend. Dividend rate of 2% on the new stock was established.

TABLE OF REPRESENTATIVE STOCKS IN THE ROCK PRODUCTS INDUSTRY DURING 1928 SHOWING THE VARIATION BETWEEN THE HIGH AND LOW POINTS AND ALSO THE TOTAL DIVIDENDS

Stocks	Low	High	Last	Div.
Alpha Portland Cement Co. com	Feb., 35	Dec., 49	46	$3.00
American Aggregates Corp. com	Nov., 50	Dec., 52	50	*.75
American Aggregates Corp. 6% bonds	June, 101	Dec., 118	115	.....
Arundel Corp.	July, 34½	May, 51	41	3.00
Atlantic Gypsum Co. 6% bonds	Dec., 85	Feb., 110	85	.....
Atlas Portland Cement Co. com	Jan., 38	Dec., 48	41	2.00
Bessemer Limestone & Cem. Co. class A com	June, 33¾	Dec., 37	36½	3.00
Boston Sand and Gravel Co. com	Mar., 74¼	May, 82	80	5.00
Canada Cement Co. new com	Oct., 26¼	Feb., 33⅞	31	.....
Canada Gypsum and Alabastine	Aug., 60	Dec., 74½	74	†.75
Dolese and Shepard Co.	Jan., 108	May, 160	120	11.50
International Cement Corp. com	Jan., 56	Dec., 83½	83	4.00
Kelley Island Lime and Transport Co. com	Apr., 45	Nov., 56½	57½	2.50
Lehigh Portland Cement Co. new com	June, 42¾	Nov., 56	52	1.87½
Missouri Portland Cement Co.	Jan., 38	May, 50½	43½	1.50
Nazareth Cement Co. com	Dec., 27	Jan., 32	27	‡.75
Pennsylvania-Dixie Cement Corp. com	Sept., 14½	May, 28½	18½	1.60
Sandusky Cement Co. com	Jan., 155	Dec., 240	240	12.00
Santa Cruz Portland Cement com	Jan., 87	Mar., 98	92	6.00
United States Gypsum Co. com	Aug., 55½	May, 91	65⅝	1.60
Universal Gypsum and Lime Co. com	Dec., ½	Feb., 4½	½	.....
Chas. Warner Co. com	Aug., 33	Nov., 43	40	3.00
Wolverine Portland Cement Co.	June, 5½	July, 6¼	5½	.60

*Initial dividend December 1. †October 1. ‡April 1.

Oregon Cement's Financial Status

DIRECTORS of the Oregon Portland Cement Co. met recently. Business conditions confronting the company were discussed, but no definite action taken with respect to the company's finances or stock in the public's hands.

It may be stated, however, that it was the consensus of opinion that if the company's business develops during the next year as is hoped for, the directors will be in a position where they can consider the matter of paying dividends on the company's common stock. Dividend rate, when and if it is declared following a satisfactory 1929 business, is entirely problematical.

The Oregon Portland Cement Co. has 71,515 shares of no-par common stock outstanding. Five shares of this stock were given as a bonus to holders of preferred stock of the Oregon Portland Cement Co. and the Sun Portland Cement Co., when those companies were merged in September, 1925. This no-par common, at the time of the merger, was assigned a nominal value of $10 a share, and the stock has never brought much more than that on the unlisted market since the merger was effected. Recent sales have been made at around $12 a share. Owners of a $100 mortgage bond of the Oregon Portland's predecessor company received stocks and cash dividends worth $583, on basis of book values and earning power. No dividends have ever been paid on the company's common, although earnings have always been ample to pay dividends on the company's 7% cumulative sinking fund voting preferred and 7% convertible preferred stocks.

Directors of the company who met were L. C. Newlands, H. L. Knappenberger, Chester V. Dolph, Edward W. Cookingham and E. B. Ireland.—*Portland* (Ore.) *Voter.*

Sandusky Cement Votes New Stock

THE STOCKHOLDERS of the Sandusky Cement Co., Cleveland, Ohio, on December 20 increased the authorized capital stock, no par value, from 75,000 shares (73,464 shares outstanding) to 250,000 shares, and approved a split up of the present outstanding stock on the basis of two new shares in exchange for each share held of April 1, 1929. The split up will probably be made on or about April 2.

The stockholders also voted to change the name of the company to the Medusa Portland Cement Co. and to increase the authorized capitalization. The new name is taken from the brand of cement the company produces and supplants the name Sandusky, since the company now has plants in Dixon, Ill.; Silica, Ohio, and York, Penn., in addition to the original plant at Bay Bridge, near Sandusky, Ohio.

National Gypsum Capital Increase

THE NATIONAL GYPSUM CO. class A and class B common stockholders of record, December 27, will be given right to subscribe for one share class A common, at $10, for every two shares class A or class B held. Rights expire January 15, when payment of $5 is due. Balance is due March 15.

Woodville Lime Products Co. Issue Bonds

DEVELOPMENT of the Woodville Lime Products Co., is forecast in the announcement of President J. J. Urschel that the company would increase its total capital to $2,250,000 with a part of the total provided for by an issue of $1,250,000 of first mortgage 6% sinking fund gold bonds dated November 1, 1928 and due November 1, 1940.

The deed of trust under which the bonds are issued made to the Toledo Trust Co., as trustee, was recorded at Fremont on December 12.

It secured the issue of bonds by a mortgage of twelve different parcels of real estate in Woodville township containing more than four hundred acres and also in lots and tracts in Woodville.

Mr. Urschel said that the issue of bonds was a part of the financing under an agreement announced several months ago whereby he had purchased the interests of his brother, the late William Urschel, in the company.

Provision is made in the financing for expansion of the company, Mr. Urschel said.

The company has its main offices at 622 Madison Ave., Toledo, Ohio, and its chief plant at Woodville. It was incorporated in 1911 with original capital of $400,000, having grown out of an earlier business founded by the Urschels.—*Toledo* (Ohio) *Times.*

Superior Cement Earnings

THE SUPERIOR PORTLAND CEMENT CO. reports for November, profit of $98,550 after depreciation, depletion and federal taxes as compared with $15,938 in November, 1927. Income for the eleven months ended November 30, totaled $959,360, as against $892,443 in the like 1927 period.

New Director Elected to Alpha Cement Board

ROBERT STRUTHERS, partner of the firm of Wood, Struthers and Co., investment bankers, New York City, has been elected a director of the Alpha Portland Cement Co., Easton, Pa. Mr. Struthers is also a director of the Borden Co., the Yale and Towne Manufacturing Co., and the Merrell-Soule Co.

One Chicago Sand and Gravel Producers' Stock Traded on Exchange

A NEWCOMER on the Chicago Stock Exchange, Material Service common, featured the preholiday session of trading with a jump of 4⅛ points, to 39¼. The stock has been listed on the exchange for less than a month and was brought out by a banking syndicate at $30 a share.

The corporation is one of the largest dealers in concrete material in the metropolitan Chicago district and sells its products to the building and road paving industries from 10 yards located in Chicago and suburbs.

The company got its start in 1919 when Henry Crown, president, and his brother, Irving Crown, treasurer, put in a capital of $10,000 for the purpose of dealing in sand, limestone and gravel. Their first place of business was a small yard, not more than 50x100 ft., at 425 North Crawford avenue, which they leased.

The Crown brothers paid a rental of $1 for each carload of material they brought into the yard, and the first month their rent bill was $5. In 1923 the company's business had grown to net sales of $2,143,670, with net earnings totaling $91,519. From that time on and throughout 1928 all net profits have been put back into the business.

The rise in the company's stock is attributed to the understanding that the annual report for 1928 will show a net considerably in excess of 1927, when the figures reached $418,290. Earnings for 1928 are expected to show a total net of around nearly $600,000. The company has 125,000 shares of $10 par capital stock authorized and outstanding. Dividends of $2 a year will be inaugurated beginning March 1.

The corporation will soon have a new self-unloading boat in service between its principal yards in Chicago and the new gravel pit at Lockport, and as a result a saving in transit charges of enormous importance is expected to be made. The boat will carry 2500 tons and will make trips every 20 hours without lifting any bridges en route, being especially constructed for this purpose.—*Chicago* (Ill.) *Tribune.*

Recent Dividends Announced

Alpha P. C. com. (quar)	75c, Jan. 15
Arundel Corp. com. (quar.)	50c, Jan. 2
Atlas P. C. pfd. (quar.)	66⅔c, Jan. 2
Bessemer Limestone & Cement A com. (quar	75c, Feb. 1
Bessemer Limestone & Cement B com.	$2.50, Feb. 1
Canada Gypsum & Alabastine	75c, Jan. 2
Cleveland Stone Co. (quar.)	50c, Mar. 1
Dolese & Shepard (quar.)	$2.00, Jan. 1
Ideal Cement Co. (quar.)	75c, Jan. 2
Ideal Cement Co. (extra)	50c, Dec. 22
Kelley Island Lime (quar.)	62½c, Jan. 2
Kelley Island Lime (extra)	50c, Jan. 2
Pacific P. C. pfd. (quar.)	$1.62½, Jan. 5
Santa Cruz P. C. (quar.)	$1.00, Jan. 1
Santa Cruz P. C. (extra)	$2.00, Dec. 24
Chas. Warner 1st and 2nd. pfd.	1¾%, Jan. 24
Chas. Warner com. (quar.)	50c, Jan. 12
Chas. Warner com. (extra)	50c, Jan. 12

Wisconsin Mineral Aggregate Association Meeting Held at Milwaukee

THE TENTH ANNUAL MEETING of the Wisconsin Mineral Aggregate Association was held at a noon luncheon, December 13, at the Plankinton Hotel, Milwaukee, Wis., with G. F. Daggett, executive secretary. The meeting was held to discuss matters of prime importance to the industry and to elect officers for the year 1929.

The year 1928 in Wisconsin was one of increased tonnage and reduction in sales value—conditions due to marketing methods—and as a step towards correcting this condition a Code of Fair Practices was adopted. The text of the code adopted follows in full:

Code of Fair Practice

The Code of Fair Practice covering competition and ethics of the Wisconsin Mineral Aggregate Association shall consist of the following points and, when accepted, shall be subscribed to in writing by all members:

1. It is the duty of every member to know all the facts concerning his products and to offer them to the public without any exaggeration as to their qualities.
2. It is the duty of every member to protect his fellow members from unfair competition and misrepresentation, and to at all times respect the rights of fellow members.
3. It shall be considered an unethical practice for members of the association:
   a. To retaliate for real or imagined unfair competition on the part of a fellow member of the association without first submitting the matter to the secretary of the association;
   b. To retaliate for real or imagined unfair competition by non-members of the association without first submitting the matter to the secretary of the association for the purpose of ascertaining that such retaliation shall not operate as unfair competition;
   c. To act purely in a selfish manner in matters which may concern or involve a fellow member, but action in such matters shall be determined by mutual agreement of the members concerned;
   d. To permit or countenance unfair and/or questionable trade practices by brokers or commission men selling materials for the member producer.
4. Members, in closing sales transactions, will exercise every care in the preparation of contracts so that there may be no subsequent misunderstanding as to the terms and conditions of the sale.
5. Should any disagreement between members arise that cannot be settled to the satisfaction of both parties by mutual agreement or by the secretary of the association, said matter shall be submitted to a committee of arbitration consisting of three members to be appointed, one by the party aggrieved, one by the accused and one by the secretary of the association. If such a committee cannot be appointed within one week after request has been made, then all three shall be appointed by the secretary.
6. By a two-thirds vote at any meeting of the association called for the purpose, any member charged with unfair practice or unethical conduct may be expelled from the association.

The following officers were elected: President, Dr. C. R. Nutt, Moraine Gravel Co., Plymouth (re-elected); vice-president, Lester L. Laun, Elkhart Sand and Gravel Co., Elkhart Lake; secretary-treasurer, V. K. Wilson, Waukesha Lime and Stone Co., Milwaukee. Directors, George B. Brew, Waukesha Washed Sand and Gravel Co., Milwaukee; A. J. Blair, Lake Shore Sand and Stone Co., Milwaukee; O. A. Cheska, North Shore Material Co., Racine; John Peters, Peters Sand and Gravel Co., Burlington, Wis.

Program of the National Crushed Stone Association

FOLLOWING is a brief outline of the program of the National Crushed Stone Association convention to be held at Cleveland, Ohio, January 21, 22, 23 and 24, 1929, Hollenden Hotel.

The address of welcome to the convention will be delivered Monday morning, January 21, by William R. Hopkins, city manager of Cleveland. Following that, a response for the association by a person not yet selected. Then the presidential address, appointment of convention committees, followed by reports of directors on business conditions in 1928 and the outlook for 1929. This completes the morning session.

A luncheon for everyone from 1 to 2 p. m., the only address being that of Dr. Hugh T. Baker, manager, Trade Association Department, Chamber of Commerce of the United States of America, Washington, D. C. Following the luncheon, at a general session in the afternoon there will be addresses by Engineer A. T. Goldbeck; H. S. Mattimore, engineer of tests and materials investigation, Department of Highways, Pennsylvania and by John W. Stull, chairman of the committee on research.

Monday evening the Manufacturers' Division Exposition will be formally opened by a smoker, with an unusual wealth of entertainment.

At the Tuesday morning session there will be addresses by J. R. Thoenen, mining engineer, Bureau of Mines, Department of Commerce; George B. Gascoigne, consulting sanitary engineer, Cleveland, Ohio; Harold Williams, Jr., member of the Boston bar, and by George E. MacIlwain, business economist, who addressed the banquet last year at West Baden.

In the afternoon, group meetings for operating men, superintendents and manufacturers will be held, with A. L. Worthen, of the Connecticut Quarries Co., as chairman, for which an unusually attractive program has been arranged, including illustrated talks by W. E. Farrell, president of the Easton Car and Construction Co.; George B. Holderer, of the Air Reduction Co., and others. Russell Rarey, of the Marble Cliff Quarries Co., will preside over a highway and sales group conference.

Tuesday evening—theater party.

At the Wednesday morning session there will be addresses by M. E. Crosby, chief engineer, Burrell Engineering & Construction Co., Chicago; Chas. M. Upham, consulting highway engineer; Dr. J. Gordon McKay, director, Cleveland Highway Research Bureau, Cleveland, and by Dr. Dexter S. Kimball, dean of engineering, Cornell University. Immediately after the group luncheons on Wednesday the report of the nominating committee will be received, followed by election of officers.

In the afternoon there will be the annual meeting of the National Agstone Association, with J. C. King, presiding, and an accident prevention conference with E. E. Evans, of the Whitehouse Stone Co., as chairman. The program for the accident prevention conference has been given unusual attention and will be most instructive and interesting. Addresses will be delivered by N. S. Greensfelder, editor of *The Explosives Engineer*, whose talk will be illustreated by motion pictures; F. F. McLaughlin, general superintendent of the Rock Cut Stone Co.; H. W. Heinrich, engineering and inspection division, Travelers Insurance Co., Hartford, Conn.; Thos. J. Quigley, chief, Mines and Quarries Section, Department of Labor and Industry, Harrisburg, Penn., and J. R. Davis, United States Gypsum Co., Chicago.

A brilliant and delightful banquet Wednesday evening, two of the speakers being Dr. Edward James Cattell, author and lecturer, of Philadelphia, and "Senator" Edward Ford. The third speaker will be from Ohio, and of national reputation. The toastmaster will be John W. Stull.

Thursday morning will be devoted to meetings of the board of directors, Manufacturers' Division and the various local associations, concluding with a general farewell luncheon.

Farmers Enter Gypsum Business

THAT the farmers of New York realize the value of gypsum as a fertilizer is apparent from the following news item from the *Buffalo* (N. Y.) *Evening Times*:

"The Grange Federation has purchased the former Gypsolite Co. plant, located on Howard street, from the Universal Gypsum and Lime Co. of Chicago, according to announcement made by H. E. Babcock, general manager of the Grange League Federation Exchange, Ithaca. The plant will be used by the federation to mix fertilizers and will serve the counties of western New York. It has been idle for three years. It is reported that the company will employ about 50 men, including its truck drivers."

Empire State Sand and Gravel Producers Association Meets at Convention in Rochester

THE third annual convention of the Empire State Sand and Gravel Producers Association, held at Rochester on December 20, proved an entertaining and successful affair. Three sessions were held at the Sagamore hotel during the day. The closing session followed a dinner at the Rochester Club in the evening, at which prominent state and city officials were guests. Members and guests attending, numbering over 100, included Stanton Walker, director of the engineering and research division, National Sand and Gravel Association, Washington; Stephen B. Story, city manager of Rochester; H. E. Smith, division engineer of the state highway department; F. M. Welch, chief engineer, American Aggregates Corp.

This association was organized at Syracuse, January 8, 1926, and now has an active membership of about 50. Firms selling machinery and equipment to the industry have been admitted to associate membership during the past year. About a dozen of these firms participated in a machinery exhibit, offering literature and exhibiting small machinery and models. They have made an excellent beginning, and this feature is bound to grow in importance and interest.

There was a general get-together session at 10 o'clock in the morning, and an informal business meeting was held at noon to receive the reports of officers and committees.

Association Activities

In his report, Secretary-Treasurer John G. Carpenter enumerated a long list of association activities. These included letters to several hundred consumers of aggregates stressing the merits of gravel, numerous bulletins issued to members and widely distributed among producers and officials, convention in January and three meetings of the association, securing improvements in methods of inspection of aggregates by the state highway department, promoting a uniform term of credit to contractors involving the solution of the collection problem, encouraging cooperation with the state Highway Contractors Association and the Crushed Stone Association, handling many freight rate matters and advocating uniform rates on sand and gravel, securing a decision from the Trunk Line Association that crushed gravel should be classed as gravel and not as crushed stone under the usual freight tariffs, visiting the majority of the plants in the state during the year and assisting many producers in solving individual problems, a membership drive which has resulted in the addition of about a dozen new members, and a program for the coming year that involves enlargement of the activities of the association.

As treasurer, Mr. Carpenter reported scarcely a third of the income had been expended, and that the association now has a balance of approximately $900 in money and property.

The policy and program for the coming year was generally discussed and referred to the executive committee.

The afternoon session opened with a luncheon given by the associate members. The program was in charge of the secretary-treasurer, John G. Carpenter.

Sand and Gravel Research

"Activities of the Research Division of the National Sand and Gravel Association," by Stanton Walker, described the activities of the laboratory and its appearance to producers, and the efforts of the national association to secure uniform specifications and gradings.

"Lengthening the Building Year," by William Burdick, secretary of the community conference board of the Rochester Chamber of Commerce, explained that for several years this board had been working on a plan which seems about to become a national undertaking of encouraging building in slack times. nder this plan the Chamber of Commerce, through a general questionnaire, has ascertained what building is in prospect, and has encouraged the prosecution of the work during the winter months and at other times when there were indications of business depression.

"Pre-qualification of Bidders on Public Work," by Harry R. Hayes, engineering secretary of the state highway chapter of the American Road Builders Association, Albany, presented a plan which is being furthered by the highway chapter to secure a more effective prosecution of public building by requiring a definite standard of efficiency and responsibility from contractors. He gave several illustrations of great losses to the state through inefficiency and delays, and stated that a large majority of the contractors approved the proposed plan.

In a short talk on the construction and operation of large plants, F. M. Welch, chief engineer for the American Aggregates Corp., stated that his firm was operating about 25 separate plants and was producing about 5,000,000 tons of aggregates per year. He stated that this business required a manufacturing plant to provide machinery and supplies, and outlined the production of sand and gravel on a large scale. He announced that in a vast majority of cases in the middle west the chances of a fair profit depended entirely upon mass production.

Business Meeting

The regular business meeting was held at 4 p. m., with President Hyman presiding. The following officers were elected: President, Henry F. Marsh, Consolidated Materials Corp., Rochester; vice-president, C. W. Maxwell, Albany Gravel Co., Albany; secretary-treasurer, John G. Carpenter, Madison Sand and Gravel Corp., Hamilton. The executive committee will comprise the above officers and John A. Taylor, of the Valley Sand and Gravel Corp., Rochester, and H. A. Stelley, of the Buffalo Gravel Co., Buffalo.

It was suggested that the next meeting of the association be held at Syracuse in March and that an effort be made to have the New York state highway chapter and the New York Crushed Stone Association meet on the same day. The secretary-treasurer was presented with a check for $100 as an expression of appreciation for his services.

The dinner given by the Valley Sand and Gravel Corp. and the Consolidated Materials Corp. at the Rochester Club at 6:30 p. m. was attended by practically all of the visitors and proved a most enjoyable and instructive affair. Considerable amusement was created by the menu, prepared by the secretary, which included such dishes as "workable slump," "field mix," "coarse aggregates," 'nuggets," "reinforced concrete" and "deleterious substances."

Mr. Carpenter, the secretary-treasurer, presided. At the speakers' table were Stephen B. Story, city manager; Henry L. Howe, engineer of design and construction of Rochester; Stanton Walker, National Sand and Gravel Association; George E. Schaeffer, president of the New York State Crushed Stone Association; E. R. Crofts, engineer for the Rochester Gas and Electric Corp., and David Hyman, president of the Buffalo Gravel Co.

"General Activities of the National Sand and Gravel Association" was ably presented by Stanton Walker. He stressed the importance of the activities of the engineering division and announced that the results of these activities were largely printed and would be presented to any interested producer upon request. He also called attention to the national convention of the Sand and Gravel Association, to be held at Cleveland on January 9, 10 and 11, and urged all producers to attend. Mr. Walker also explained how the national association was solving the problems which perplex producers, and advised them to kepe in touch with research agencies, and told how reports of this work could be procured.

Henry L. Howe, engineer of design and

construction for the city of Rochester, speaking on the subject "Silt—Its Effect in Concrete," stated that the lack of a certain quantity of so-called silt weakened concrete, while an excess of silt caused the same result. He asserted that within certain limitations the presence of silt in concrete aggregates was not injurious. He added that several manufacturing firms had advocated the use of hydrated lime and similar substances to increase the plasticity of concrete mix, and asserted that this was unnecessary if a slight percentage of silt were left in the aggregate, probably 1%.

The subject "Sand and Gravel in Power Dam Construction" was ably and interestingly handled by E. R. Crofts, engineer of the Rochester Gas and Electric Corp. He enumerated briefly the development of the company's water rights along the Genesee valley and the recent construction of the extensive Canadea dam near Hornell, N. Y. The main point of his talk was confined to the proposed dam at Mt. Morris, 25 miles south of Rochester, which, if built, will be 210 ft. high and will require 400,000 tons of aggregate. He stated that producers should not look for the immediate construction of the Mt. Morris dam, however, because there was no economic need for it.

Registration

The following sand and gravel companies were represented at the convention:

Valley Sand and Gravel Corp., Rochester: Homer W. Storey, B. G. Lucas, John A. Taylor, W. A. Flynn, Edward G. Stallman, L. M. Beattie.

Albany Gravel Co., Albany: C. W. Maxwell.

Alfred-Atlas Gravel and Sand Corp., Alfred: Ray W. Wingate, Leonard Claire.

Consolidated Materials Corp., Rochester: R. C. Brotsch, Henry F. Marsh.

Buffalo Gravel Corp., Buffalo: H. A. Stelley, David Hyman.

Olean Sand and Gravel Co., Machias: E. A. Allison.

Madison Sand and Gravel Corp., Hamilton: John G. Carpenter, F. A. Risley, Wm. C. Long.

Nathan Oaks and Sons, Oaks Corners: Nathan Oaks, Carlton V. Oaks.

Rock-Cut Stone Co., Syracuse: E. W. Foote.

Elam Sand and Gravel Corp., Rochester: F. H. Elam.

The following were the guests present:

Stanton Walker, director, engineering and research division, National Sand and Gravel Association, Washington, D. C.; Henry L. Howe, director of design and construction, Rochester; F. M. Welch, chief engineer, American Aggregates Corp., Greenville, Ohio; Stephen B. Story, city manager, Rochester; Frederick W. Burton, manager, transportation bureau, Rochester Chamber of Commerce, Rochester; John F. Ancona, engineer, Rochester; Fred C. Line, department of public works, Rochester; John P. Larsen, New York state department of public works; Fred R. Bemish, bureau design and construction, Rochester; F. J. Reichenberger, bureau design and construction, Rochester; H. R. Moulthrop, bureau design and construction, Rochester; James E. Kelly, senior assistant engineer, state of New York, Rochester; Roy P. Warren, civil engineer, Rochester; H. Walter Hughes, supervisor, division of tests and materials, Rochester; Eugene T. Pope, bureau of design and construction, Rochester; George R. Newell, civil engineer, Rochester; George C. Wright, county superintendent of highways, Rochester; George G. Miller, state department of public works, Rochester; Fred C. Tacer, state department of public works, Rochester; H. L. Michael, state department of public works, Rochester; George E. Priest, Rib-Stone Concrete Corp., Le Roy; Alexander Russell, Lake Ontario Water Service Corp., Rochester; M. M. Reynolds; E. R. Crofts, Rochester Gas and Electric Corp., Rochester; George E. Schaefer, New York State Crushed Stone Association; Harold Baker, commissioner of public works, Rochester; J. E. Orebaugh, Marietta Concrete Corp., Marietta, Ohio; Col. Nathan Shiverick, Avon, N. Y.; H. S. Hutcheson, Newark; Harry R. Hayes, New York state highway chapter, Albany; E. P. Forestell, New York state highway chapter, Buffalo; George W. Chambers, New York state highway chapter, Rochester; F. J. Collins, Dale Engineering Co., Rochester; John B. Ehrhart, Rochester Vulcanite Corp., Rochester; Gus Rogers, Allentown Portland Cement Co.; Sanford Smith, highway department, Rochester; E. G. Cole, *Democrat and Chronicle*, Rochester; John V. Lewis, department of public works, Rochester.

The following manufacturers' representatives were present:

A. Nagel, New Jersey Wire Cloth Co.; V. J. Milkowski, Morris Machine Works, Baldwinsville; R. P. Holdubaum, Webster Manufacturing Co.; N. S. Snyder, Link-Belt Co.; Grant Ellen, W. S. Tyler Co.; J. R. Norton, Smith Engineering Works; W. D. Guiney, Buffalo Belting Co.; Thomas MacLachlan, Vulcan Iron Works; Frank D. Manning, Osgood Co.; A. E. Fielding, Niagara Screens Co.; B. G. Perlberg, Wheeling Mould and Foundry Co.; F. J. Wolder, Barr and Creelman, Rochester; H. W. Butler, Whitmore, Rauber and Vicinus, Rochester; Charles H. Imson, Rochester; Albert C. Wood, Bennett and Wood, Inc., Rochester.

Keystone Company Opens New Pittsburgh Gravel Handling Plant

ONE of the most modern sand, gravel and concrete plants in the Pittsburgh harbor was placed in operation recently by the Keystone Sand and Supply Co. This plant, on the left bank of the Monongahela river, at South Third street, is an addition to the many terminal facilities on this stream. The river wall, resting on concrete piles, is of the hollow type with two levels; the river level is for the employes engaged in securing the barges. Three electric capstans used in moving the barges are on this level, while on the top floor a traveling Dravo whirler, equipped with a 3 cu. yd. bucket, removes material from the barges, and places it in storage bins with a capacity of 25,000 tons.

The various grades of sand and gravel are moved by means of a belt conveyor, 200 ft. long, across the tracks of the Pittsburgh and Lake Erie railroad to delivery bins with a capacity of 2000 tons. These are arranged in such manner that 20 trucks can be loaded at one time. The so-called "Batcher" truck is loaded without delaying trucks carrying other material.—*Pittsburgh* (Penn.) *Post-Gazette*.

"Jim" Savage Elected President of New York State Crushed Stone Association

THE New York State Crushed Stone Association met for its annual meeting and election at Syracuse, N. Y., December 19. Twenty-two members were present. The report of the secretary, Francis C. Owens, Rock-Cut Stone Co., Auburn, N. Y., showed a treasury balance of $100—for which he was duly commended.

James Savage

The main business of the meeting was the election of officers for 1929. The nominating committee consisting of Grover Murphy, General Crushed Stone Co., Little Falls, N. Y., chairman; J. E. Cushing, Cushing Stone Co., Schenectady, N. Y., and A. B. Caldwell, Genesee Stone Products Co., Batavia, N. Y., nominated James Savage, of the Buffalo Crushed Stone Co., Buffalo, N. Y., for president; J. L. Heimlich, of the Le Roy Lime and Stone Co., Le Roy, N. Y., for vice-president, and A. S. Owens, of the Peerless Quarries, Utica, N. Y., for secretary-treasurer.

Jim Savage nominated John Odenbach, of the Dolomite Products Co., Rochester, N. Y., as president, from the floor, but his nomination was voted down, and "Jim" was unanimously elected.

The balance of the meeting was devoted to a discussion of the proposed New York state lien law, and to plans for the National Crushed Stone Association convention at Cleveland in January. A special car for the New York state men will leave on Saturday evening, January 19.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Nov. 17	Nov. 24	Nov. 17	Nov. 24
Eastern	2,649	2,335	11,240	8,965
Allegheny	3,503	3,255	7,683	6,162
Pocahontas	434	298	880	816
Southern	518	622	11,126	9,858
Northwestern	950	963	5,704	4,095
Central Western	511	474	8,616	9,463
Southwestern	399	378	6,735	6,865
Total	8,964	8,325	51,984	46,224

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

	Limestone Flux Period to Date		Sand, Gravel and Stone Period to Date	
	1927	1928	1927	1928
District	Nov. 26	Nov. 24	Nov. 26	Nov. 24
Eastern	154,992	139,712	523,990	536,071
Allegheny	166,207	162,534	400,121	356,987
Pocahontas	23,893	21,718	45,617	38,841
Southern	27,477	27,548	572,907	500,848
Northwestern	61,546	61,774	338,700	313,027
Central Western	23,237	20,967	452,403	481,304
Southwestern	17,005	19,267	276,260	299,260
Total	474,357	453,520	2,609,998	2,526,338

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

	1927	1928
Limestone flux	***474,357***	***453,520***
Sand, stone, gravel	***2,609,998***	***2,526,338***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning December 29:

SOUTHERN FREIGHT ASSOCIATION DOCKET

43085. **Phosphate rock,** from Florida mines to New York, N. Y. (when for New York Dock Ry. delivery). It is proposed to make the present rates on phosphate rock named in A. C. L. R. R.'s I. C. C. B2536, from Florida mines to New York, N. Y., applicable also when for New York Dock Ry. delivery.

43086. **Sand and gravel,** from Warmore and Ellerslie, Va., to Snowden, Va. Present rate, 165c per net ton (Richmond combination). Proposed rate on sand and gravel, carloads (See Note 3), from and to points mentioned, 151c per net ton.

43130. **Shale,** from Bone, Ga., to Milledgeville, Ga. Present rate, 6½c per 100 lb. Proposed rate on shale, in bulk, to be manufactured (See Note 3), from Bone, Ga., to Milledgeville, Ga., 90c per net ton.

43131. **Stone,** from Clermont, Ky., to L. & N. R. R. stations. It is proposed to establish rates on stone, carloads, from Clermont, Ky., to stations on the L. & N. R. R. main line, Bardstown branch and Lebanon branch. A statement showing present and proposed rates to the destinations involved will be furnished upon request.

431137. **Sand, gravel, crushed stone, etc.,** between Atlanta & St. Andrews Bay Ry. stations and points in Alabama and Georgia. It is proposed to change the status of the A. & St. A. B. Ry. from relief line to trunk line in Agent Glenn's I. C. C. A655, for application between Limco, Fla., and Dothan, Ala., inclusive, and between Limco, Fla., and Dothan, Ala., on the one hand, and points in Georgia and Alabama, on the other hand.

43215. **Sand, gravel, crushed stone, etc.,** from Carrollton, Ky., to Flemingsburg, Ky. Present rate, 205c per net ton (Combination.) Proposed rate on sand, gravel, crushed stone, slag, rubble stone, broken stone and chert, in straight or mixed carloads (See Note 3), from Carrollton, Ky., to Flemingsbury, Ky. (intrastate only), 165c per net ton, made with relation to rates in effect from Louisville, Ky., and Cincinnati, O., to Flemingsburg, Ky.

Note 1—Minimum weight marked capacity of car.
Note 2—Minimum weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

43292. Commodity rates between Glasgow Ry. stations, locally, and between points on the Glasgow Ry. on the one hand and Southern points on the other. It is proposed to amend:
Agent Speiden's Lime Tariff I. C. C. 1250.
Agent Glenn's Lime Tariff I. C. C. A684.
Agent Glenn's Florida Sand and Gravel Tariff I. C. C. A668.
Agent Glenn's Sand, Gravel, Slag, Stone and Chert Tariff I. C. C. A655.
Agent Glenn's Cement Tariff I. C. C. 674—
in order to revise the present rates on lime, cement, crushed stone, chert, slag, etc., to reflect the Trunk Line basis for joint hauls; also to make the Glasgow Ry. a party to the Trunk Line single line and joint line scales on these commodities.

43329. **Granite or stone, crushed or rubble,** from Lassiter, N. C., and **sand** from Sandstone and Goldsboro, N. C., to Toddy, N. C. The present rates, as published in Supplement 14 to A. C. L. R. R., I. C. C. B-2477, on the commodities mentioned, from and to the points in question, where established to meet an emergency existing at the time the rates were published. There now being no further need for these lower rates, it is proposed to cancel them and permit the mileage rates as published in Agent Cottrell's North Carolina Joint Tariff, I. C. C. 710, to apply.

43330. **Chert, gravel, sand, slag and stone,** between stations on the A. & St. A. B. Ry. in Alabama and between these stations and other Alabama points. It is proposed to establish locally over the line of the A. & St. A. B. Ry., and jointly with A. & St. A. B. Ry. and other carriers, on Alabama intrastate traffic, the straight trunk line basis (scales 1 and 2 respectively), page 111, Agent Glenn's I. C. C. A-651, on chert, gravel, sand, slag and stone, carloads.

43377. **Calcite, ground or pulverized,** from Sparta, Tenn., to Medina, O. Cincinnati, O., combination rate now applies. Proposed rate on **calcite, ground or pulverized (ground or pulverized limestone or marble),** carloads (See Note 3), from Sparta, Tenn., to Medina, O., 470c per net ton, same as rate in effect to Akron and Cleveland, O.

43392. Switching charge on **sand and gravel,** between locations within the yards of the Kirkpatrick Sand and Gravel Co., Jackson's Lake, Ala. It is proposed to establish a switching charge of $7.20 per car on sand and gravel between locations within the yards of the Kirkpatrick Sand and Gravel Co. at Jackson's Lake, Ala. (intrastate). Proposed charge is the same as assessed on similar traffic at other points on the L. & N. R. R.

43406. **Gravel,** from Jedburg and Pacific, Mo., to New Orleans, La. It is proposed to cancel the present through rate of 420c per net ton on gravel, carloads, from Jedburg and Pacific, Mo., to New Orleans, La., which is in excess of combination on East St. Louis, Ill., leaving combination rate to apply.

43419. **Ground or pulverized limestone or marble,** from Cartersville, Ga., to Birmingham & Southeastern R. R. stations. It is proposed to establish the following reduced rates on ground or pulverized limestone or marble, carloads (See Note 3), from Carterville, Ga., to Cotton Valley, Wilda, Liverpool, Ala., 189c; Wheatley, Wares Mill, Colebee, Conifer, Tuckabatchie, Ala., 185c; Tallassee, Bowens, Tuckabatchie Eclectic, Ala., 189c per net ton. Proposed rates are made with relation to rates recently established from Ladds and Portland, Ga.

TRUNK LINE ASSOCIATION DOCKET

19822, Sup. 1. **Crude fluxing limestone,** carloads (See Note 2), Bakerton, W. Va., Capon Road, Va., Engle, Kearneysville, Martinsburg and Millville, W. Va., and Stephens City, Va., to Phillipsdale, R. I., 18½c per 100 lb., to apply only when shipped in open top equipment except during period of car shortage when shipper orders open top equipment and carrier for its convenience furnishes box car account of inability to supply open top equipment, the rates provided for open top equipment will apply.

19996. **Stone, natural,** crushed, carloads (See Note 2), from Marlboro, N. Y., to New Windsor, Vail's Gate, Salisbury Mills, Washingtonville, Blooming Grove, Craigville and Chester, N. Y., $1.10 per net ton. Reason—The proposed rate compares favorably with rates from Otisville to Blooming Grove, Washingtonville and Unionville, N. Y.

19918. **Limestone, ground or pulverized, and limestone dust,** carloads, minimum weight 50,000 lb., from Jamesville, N. Y., to Hammondsport, N. Y., $2.20 per net ton. Reason—The proposed rate is fairly comparable with rates on like commodities for like distances, services and conditions.

19848, Sup. 1. **Limestone, ground or pulverized,** carloads, minimum weight 50,000 lb., from Blakeslee, N. Y., to Cooperstown, N. Y., $1.75 per net ton.

19944. (a) **Sand** (other than blast, engine, foundry, molding, glass, silica, quartz or silex), carloads; (b) **sand, blast, engine, foundry, molding, glass, silica, quartz or silex,** carloads (See Note 2), from Baltimore, Md., to Walkersville, Md., (a) $1.40, (b) $1.53 per net ton. Reason—The proposed rates are fairly comparable with rates now in force to Frederick, Keymar and Union Bridge, Md.

19799, Sup. 2. (A) **Building sand,** carloads; (B) **Sand, blast, engine, foundry, molding, glass, silica, quartz or silex,** carloads (See Note 2), from Berkeley Springs district to York, Penn., (A) $1.40 and (B) $1.50 per net ton.

20018. **Limestone, ground, precipitated or pulverized, and limestone dust,** carloads, minimum weight 50,000 lb., from Atlas, Hamburg and Lime Crest, N. J., to Harrisonburg, Va., 22½c per 100 lb. Reason—Proposed rates compare favorably with rates on like commodities from same points to Richmond, Va.

20028. **Sand, other than blast, engine, foundry, glass, molding or silica, and gravel,** N. O. I. B. N. in O. C., carloads (See Note 2), from Marlboro, N. Y., to Ashoken, Cold Brook, Mt. Pleasant and Phoenicia, N. Y., $1.85 per net ton. Reason—Proposed rates are fairly comparable with rates on like comodities from and to points in the same general territory.

20029. **Sand, other than blast, engine, fire, foundry, glass, molding or silica, and gravel,** N. O. I. B. N. in O. C., carloads (See Note 2), from Tioga, Penn., to Nelson and Tompkins, Penn., 70c per net ton. Reason—Proposed rates are fairly comparable with rates on like commodities from and to points in the same general territory.

20040. **Crushed stone,** in bags, in mixed carloads, minimum weight 50,000 lb., from Baltimore, Md., to Richmond, Petersburg and Lynchburg, Va., 16c per 100 lb. Reason—The proposed rate is comparable with rates now in force from Harrisburg, Penn.

20044. **Limestone, furnace,** carloads, when shipped in open top equipment, from Stephens City, Va., to Eddystone, Penn., $2.17 per gross ton. Reason—The proposed rates are comparable with rates on like commodities for like distances, services and conditions.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

15764. **Sand, building, common or run-of-bank,** carloads (See Note 3), from Avon, Conn., to Amenia, N. Y., $1.50 per net ton via N. Y. N. H. & H. R. R.-Brewster, N. Y.-N. Y. C. R. R. Reason—Present combination rate excessive and prohibits movement of any business.

15808. **Molding sand,** carloads (See Note 3), from Ushers, N. Y., to Cornwall, Ont., $3.91 per

net ton, via White River Junction, Vt.—C. V. Ry. —Swanton, Vt., and C. N. Rys. Reason—To meet carrier competition.

15810. **Sand, common building and gravel, screenings,** carloads (See Note 2), furnished, from Greenbush, Mass., to Nepsonset, Mass., 50c per net ton. Reason—to meet water competition.

15892. To provide for the application of the Albany basis of rates in connection with commodity rates on **molding sand,** carload minimum weight 40,000 lb. (O. C.), published in Agent Van Ummersen's I. C. C. No. 50, from Saratoga Springs, N. Y., to point in Central Freight Association territory, taking Rate Basis Nos. 78 to 120, inclusive, in lieu of the present Boston basis of rates now applicable as published in Agent Van Ummersen's I. C. C. No. 50. Reason—To meet carrier competition.

15905. **Stone, crushed,** carloads (See Note 3), from Westfield, Mass., to Centerdale and Smithfield, R. I., $1.30 per net ton. Reason—To provide rates at the usual differential over Connecticut quarries.

15854. **Sand, building, common or run of bank,** carloads (See Note 2), from Beacon, N. Y. (ex barge), to Moores Mills, N. Y., 70c. Reason—To provide rate same as now in effect to points on both sides of Moores Mills.

15857. **Crushed stone,** from Westfield, Mass., to Williamstown, Mass., 15c (sixth class) per N. Y., N. H. & H. R. R. I. C. C. F2420, via B. & M. R. R. Reason—Present rate obsolete.

15858. **Broken or crushed stone,** carloads (See Note 2), from Westfield, Mass., to Hope, R. I., $1.30 per net ton. Reason—To meet motor truck competition.

CENTRAL FREIGHT ASSOCIATION DOCKET

20199. To establish on **crushed stone,** carloads, from Sandusky, O., to East Rochester and Kensington, O., rate of 135c per net ton. Present rate —150c per net ton.

20200. To establish on **crushed stone and crushed stone screenings,** carloads, Delphos, O., to Mark Center, O., rate of 90c per net ton. Routing—Via N. Y. C. & St. L. R. R. Holgate, O., and B. & O. R. R. Present rate—Sixth class.

20201. To establish on **crushed stone,** carloads, Milltown, Ind., to Jasper, Ind., 77c per net ton, and to Dubois, Ind., 81c per net ton. Present rate —81c to Jasper and 86c per net ton to Dubois, Ind.

20212. To establish on spent **refuse grinding sand,** to be shipped in open top equipment, carloads, Butler, Penn., to Wampum, Penn., via B. & O. New Castle Junction, Penn., P. & L. E. R. R., rate of 100c per ton of 2000 lb. Present rate—12c.

20220. To establish on **crushed stone,** carloads, from Carey, Rimer, Findlay, Lima, Bluffton, Arlington and Lewisburg, O., to Celina, Coldwater, Ft. Recovery, New Bremen and Minster, O., following rates (in cents per net ton):

	Carey (N. O.)		Rimer (N. O.)	
	From			
To	Pres.	Prop.	Pres.	Prop.
Celina	70	95	70	95
Coldwater	70	100	70	95
Ft. Recovery	70	100	70	100
New Bremen	70	95	70	95
Minster	70	95	70	95

	From			
	Findlay (N. K. P.)		Lima (N. K. P.)	
To	Pres.	Prop.	Pres.	Prop.
Celina	70	90	60	75
Coldwater	70	90	60	80
Ft. Recovery	70	100	70	85
New Bremen	70	90	60	70
Minster	70	90	60	75

	From			
	Bluffton (N. K. P.)		Arlington (N. O.)	
To	Pres.	Prop.	Pres.	Prop.
Celina	60	85	70	90
Coldwater	60	85	70	95
Ft. Recovery	70	90	70	95
New Bremen	60	80	70	90
Minster	60	85	70	90

To	From Lewisburg (C.N.) Present	Proposed
Celina	60	85
Coldwater	60	85
Ft. Recovery	....	....
New Bremen	....	....
Minster	....	....

20238. To include Waukesha and Burlington, Wis., for account of the C. M. St. P. & P. Ry., also the M. St. P. & S. S. M. Ry., as origin points in Item 1220 of C. F. A. L. Tariff 130S, naming a commodity rating from Milwaukee, Wis., via Chicago, on **agricultural limestone, etc.,** carloads, of 60% of sixth class to C. F. A. territory, and 70% of sixth class rating to Canadian territory. Present basis—Classification basis applies.

20245. To establish on **sand** (all kinds) **and gravel,** carloads, in open cars (See Note 3), from Massillon, Crystal Springs, Pauls, Warwick and Barberton, O., to Girard and Niles, O., rate of 80c per ton of 2000 lb. When loaded in box car equipment, rate will be 115% of the rate shown for open cars or 92c per ton of 2000 lb.. Present rate —90c per ton of 2000 lb., per B. & O. Freight Tariff 1935, Ohio No. 5540. Route—Via Ohio Junction, O.

20247. To establish on **crushed stone and screenings,** carloads, Whitehouse, O., to destinations in Michigan shown below, following rates (in cents per net ton):

To	Present	Proposed
Grand Rapids, Mich.	Sixth Class	165
Grand Haven, Mich.	Sixth Class	165
Muskegon, Mich.	Sixth Class	175
Sparta, Mich.	Sixth Class	155
Greenville, Mich.	Sixth Class	165
Sheridan, Mich.	Sixth Class	155
Clifford, Mich.	Sixth Class	145

Route—Wabash Ry., Detroit, Mich., G. T. Ry.

20264. To establish on **slag** (a product of iron and steel blast or open hearth furnaces), **crushed stone and sand and gravel,** in bulk, in open cars, carloads, from Chicago, Ill., and Chicago rate points to Maynard, Hartsdale, Schererville, Crown Point and Leroy, Ind., rates as shown in Exhibit "B" attached. Present and proposed rates—As shown in Exhibit "B" attached.

EXHIBIT "B"

Commodity: Carloads crushed stone, carloads sand and gravel, from Chicago, Ill., and Chicago rate points (rates in cents per net ton).

To Pa. R. R. Stas.	Miles	Rates Prop.	Pres.	Single line Kickapoo "x" Scale
Maynard, Ind.	30	76	80	65
Hartsdale, Ind.	33	76	85	70
Schererville, Ind.	34	77	92	70
Crown Point, Ind.	41	77	92	75
Leroy, Ind.	48	77	92	75

Commodity: Carload slag, from Chicago, Ill., and Chicago rate points.

To Pa. R. R. Stas.	Miles	Rates Prop.	Pres. "x"
Maynard, Ind.	30	....	76
Hartsdale, Ind.	33	....	76
Schererville, Ind.	34	77	101
Crown Point, Ind.	41	77	101
Leroy, Ind.	48	77	101

Commodity: Carload crushed stone, from Joliet, Ill.

To Pa. R. R. Stas.	Miles	Rates "z"
Maynard, Ind.	36	80
Hartsdale, Ind.	....	....
Schererville, Ind.	34	77
Crown Point, Ind.	41	77
Leroy, Ind.	48	77

Commodity: Carload crushed stone, from McCook, Ill., Gary, Ind., Thornton, Ill., South Chicago, Ill.

To Pa. R. R. Stas.	Miles	"x" Pres. Rates
Maynard, Ind.	36	77
Hartsdale, Ind.	....	**77**
Schererville, Ind.	34	77
Crown Point, Ind.	41	77
Leroy, Ind.	48	92

Commodity: Carload slag, from Irondale, Ill.

To Pa. R. R. Stas.	Miles	"x" Pres. Rates
Maynard, Ind.	36	76
Hartsdale, Ind.	....	77
Schererville, Ind.	34	77
Crown Point, Ind.	41	77
Leroy, Ind.	48	101

Commodity: Carload sand and gravel, from Irondale, Ill., Joliet, Ill., Plainfield, Ill., South Chicago, Ill., Stockton, Ill.

To Pa. R. R. Stas.	Pres. Rates "z"
Maynard, Ind.	80
Hartsdale, Ind.	....
Schererville, Ind.	77
Crown Point, Ind.	77
Leroy, Ind.	77

Commodity: Carload slag, from Gary and Hammond, Ind., Joliet and South Chicago, Ill.

To Pa. R. R. Stas.	Pres. Rates "z"
Maynard, Ind	76
Hartsdale, Ind.	....
Schererville, Ind.	76
Crown Point, Ind.	80
Leroy, Ind.	80

"x"—Distances from Chicago.

Tariff authority: "x"—C. F. A. 197 K. I. C. C. 2079; "z"—E. J. & E. Ry. 14G, I. C. C. 2122.

20287. To establish on **sand** (except blast, core engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), and **gravel,** carloads, Ginger Hill and Rupel, Ind., to Manteno, Ill., via N. Y. C. R. R., Kankakee and Illinois Central R. R., rate of 110c per net ton. Present rate, 122c per net ton.

20303. To establish on **crushed stone and crushed stone screenings,** carloads, Waterville, O., to Flint, Mich., via N. Y. C. & O. St. L. R. R., Toledo, Ohio-P. M. Ry. Rate of 117c per net ton of 2000 lb. Present rate, 161c per ton of 2000 lb.

20305. To establish on **crushed stone,** carloads, East Liberty, O., to Lima, O., rate of 85c per net ton. Present rate, sixth class.

20316. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel,** carloads, Hugo, O., to Youngstown, O., rate of 70c per net ton. Present rate, 80c per net ton.

20322. To establish on **foundry sand,** burnt or refuse, carloads, Ashland, O., to Cincinnati, O., 200c per ton of 2000 lb. Present rate, sixth class, 20½c.

20333. To establish on **sand, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica,** carloads, from Portland, N. Y., to points shown below, following rates (in cents per net ton):

To	Prop.	Pres.
Jamestown, N. Y.	151	240
Meadville, Penn.	164	300
New Brighton, Penn.	227	430
New Castle, Penn.	164	400
Pittsburgh, Penn.	227	430
Toledo, O.	227	450
Youngstown, O.	164	400

20336. To establish on **crushed stone,** carloads, White Sulphur, O., to stations on the B. & O. R. R. (West) shown below, following rates (in cents per net ton):

To	Prop.	Pres.
Ohio Division		
(Midland Branch)		
Orient, O.	90	80
Derby, O.	90	85
Era, O.	90	85
Mt. Sterling, O.	90	85
Newark Division		
(Main Line)		
Toboso, O.	100	90
Nashport, O.	100	90
Pleasant Valley, O.	100	90
Dillon, O.	100	90
Zanesville, O.	*90	90
(Shawnee Branch)		
Shawnee, O.	100	90
(Marietta Branch)		
Cedar Run, O.	(1)	105
Stockport, O.	(1)	115
Lowell, O.	(1)	125
Marietta, O.	(1)	135
Toledo Division		
(Main Line)		
Trenton, O.	105	100
Busenbark, O.	105	100
Overpeck, O.	105	100
Hamilton, O.	105	100
Stockton, O.	115	100
Glendale, O.	115	100
Cincinnati, O.	†90	100
	(1)	

*Rate applicable via C. C. C. & St. L. Ry., Columbus, O., and N. Y. C. (O. C. L.).

†Rate applicable via C. C. C. & St. L. Ry. direct.

(1) Sixth class.

20340. To establish on **limestone, ground or pulverized,** carload, minimum weight 40,000 lb., Piqua, O., to points in Ohio, basis of 60% of sixth class rates. Present specific commodity rates to be canceled.

20343. To establish on **sand, blast, engine, filter, fire or furnace, foundry, glass, grinding, loam, molding or silica,** carloads, Hulton, Penn., to C. F. A. territory, same commodity rates as in effect from the River Valley group. Present rates, sixth class.

20374. To establish on **crushed stone,** carloads, Carey, O., to Wayland and Newton Falls, O., rate of 125c, and to Tippecanoe, O., rate of 135c per net ton, for application via C. C. C. & St. L. Ry., Tiffin, O., and B. & O. R. R. Present rate, sixth class.

ILLINOIS FREIGHT ASSOCIATION DOCKET

4796. **Sand and gravel,** carloads, from Chillicothe, Ill., to Goose Lake, Ill. Present, $1.08 per ton; proposed, 95c per ton.

4805. **Sand and gravel,** carloads, from Milwaukee, Wis.

To	Present	Proposed
Davenport, Ia.	$2.00	$1.30
Bettendorf, Ia.	2.00	1.30

4351B. **Sand and gravel,** carloads, usual minimum weight, from Moronts, Ill., to R. T. & N. R. R. stations, viz.: McNabb, Price Valley, Magnolia, Henry Jct., Big Sandy, Porterfield and Custer, Ill. Present rate, combination; proposed, 88c per net ton.

4822. **Limestone, viz., crushed or ground,** carloads, from Valmeyer, Ill., to C. F. A. destinations (rates in cents per ton of 2000 lb.):

To (Representative points)	Pres.	Prop.
Akron, O.	610	412
Cincinnati, O.	500	342
Toledo, O.	570	372
Detroit, Mich.	590	392
Evansville, Ind.	370	272
Louisville, Ky.	470	322
Pittsburgh, Penn.	700	482

Duty on Belgian Sand Removed by New Ruling

BELGIAN SAND and other similar glass sands may be imported into the United States free of duty, according to a ruling by the Commissioner of Customs of the Treasury Department, E. W. Camp. The Treasury ruling is made in a letter from Mr. Camp to the Collector of Customs of the port of New York, which follow in full text:

The Department refers to its decision, T. D. 42820, holding that Belgian sand and other similar sands used in the manufacture of glass were properly subject to duty at the rate of $4 per ton under the provision in paragraph of the Tariff Act of 1922 for crude silica and were not free of duty under the provision in paragraph 1675 for sand.

The Department's ruling was predicated upon information which constrained it to believe that Belgian sand and other glass sands were commercially known as silica and its conclusion that the merchandise was dutiable as silica was in part derived from information furnished by the Geological Survey, Department of the Interior, and the Bureau of Standards, Department of Commerce.

Following the publication of the ruling protests were filed by importers of Belgian sand contending that this sand is commercially known as sand and not as silica, and is accordingly free of duty as such.

Question Again Investigated

In view of the protests filed the Department again took this matter up for consideration and investigated and requested a further expression of views from the Geological Survey and the Bureau of Standards upon the subject and also requested an expression of views from the Bureau of Mines, Department of Commerce.

The Geological Survey in its present letter, after discussing the question and showing the various uses of the merchandise and its various designations, concludes with the statement that as the classification depends upon commercial designation rather than by use, it is of the opinion that it is not subject to duty as silica but is free of duty as sand.

The Bureau of Standards describes the several uses to which silica is put, for example, as wood filler, scouring soaps, foundry mold wash, metallurgic and chemical processes, etc., but states that in none of the uses referred to is it known as silica but under various names such as "flint," "silex," "foundry sand," etc. The Bureau also states that Belgian sand is also known commercially as glass sand, and closes the discussion of the question with the statement that commercially but rather a minor part of the total amount of silica marketed is commercially known as such.

Sand Classification Stands

The bureau of Mines states that while the term "silica" is sometimes applied as a class name for miscellaneous group of mineral substances such as quartz, flint, chert, infusorial earth, etc., these terms are of special usage rather than commercial terms, and that the Bureau does not regard glass as silica and is always termed sand in commerce.

In view of the reports received, the Department feels that its previous decision, T. D. 42820, was based upon an erroneous view of the facts and it is now satisfied that Belgian sand is not known commercially as silica but is bought and sold and known in the trade as Belgian sand.

In this connection and persuasive of the correctness of the present position of the Department, I deem it proper to refer to the debate on the floor of the Senate when the subject of Belgian sand was being discussed as an amendment to paragraph 207.

Senate Debate Cited

An amendment was offered on the floor to paragraph 207 as follows: "Glass sand, $1.50 per ton," and later amended to read, "Glass sand containing 99% or more of silica, $1.50 per ton." This amendment was agreed to, but when the bill went to conference it was stricken out.

It is clear from the discussion on the floor of the Senate that it was the opinion of the members that without this amendment glass sand would be free of duty. The question was not whether it would be dutiable as silica but whether it should be free of duty or assessed with duty at the rate of $1.50 per ton. As the suggested amendment was in the interest of domestic manufacturers, it is clear that not only the members of the Senate, but the domestic interests, felt that it was necessary to have glass sand specifically provided for, neither the domestic interests nor the members of the Senate believing that it was included with the term "silica" as used in pragraph 207 of the Tariff Act.

For the reasons stated, and after a very careful consideration of this question, the Department feels constrained to rescind its ruling, T. D. 42820, and you are, accordingly, directed to admit Belgian sand and other similar glass sands free of duty under paragraph 1675 of the Tariff Act.

Volunteer Cement Mill to Add Third Kiln

THE VOLUNTEER PORTLAND CEMENT CO., Knoxville, Tenn., recently has increased production from the original six carloads daily to 20 carloads and plans to install a third unit during 1929 which will boost production 50% more.

Charles Lewis, manager, made the announcement recently.

The third unit, consisting of a kiln and accompanying equipment, will cost more than half a million dollars, Mr. Lewis estimated.

The present two-kiln plant is turning out a capacity daily output of 20 carloads. Yet, the plant cannot supply the demand, according to Mr. Lewis.

Few, if any, additional employes will be required by the installation of a third unit, he said. He explained that fewer men were needed as the manufacturing processes became smoother.

"We used more than 150 men at the outset and now with production trebled we are employing only 125," he pointed out.

The plant will produce 30 carloads a day when the third kiln is added.—*Knoxville* (Tenn.) *News Sentinel.*

Long Island North Shore Residents Fight Gravel Operations

THE NORTHPORT CIVIC ASSOCIATION, the Long Island Chamber of Commerce and the incorporated village of Asharoken are planning for a finish fight against the sand and gravel companies that are alleged to be defacing the shore front in Northport, according to an exchange of letters between Paul Grout of Asharoken and the two sand and gravel organizations.

The Steers Sand and Gravel Co. has been operating in Northport for many years and only two years ago started on a new location. The latest move has been by the Goodwin-Gallagher Sand and Gravel Co., operating under the corporate name of the Metropolitan Sand and Gravel Co., which company recently purchased what is locally known as the Hall property at a reported price of $700,000.

This company gave formal notice that it would appear before the secretary of state at Albany on December 29, to apply for a grant of land under water on the Long Island Sound adjacent to the property in question. The object of the sand company is to erect a breakwater and dredge a sheltered harbor through Crabmeadow Cove.

The matter has been brought to the attention of the Long Island Chamber of Commerce through a letter from Paul Grout to Meade C. Dobson, managing director of the Long Island Chamber of Commerce, in which he says that these enterprises, referring to those of the Steers company and the new project of the Metropolitan company, are of incalculable damage to the localities where they are in operation, depreciating property values in the vicinity, filling the bottom of the waters adjacent to the property with silt injurious to all shellfish, etc., and bring a class of people who are not of any benefit to the communities, as well as destroying the beauty of the locality.—*Huntington* (N. Y.) *Long Islander.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Aggregate Handling Plant for a Modern Concrete Pipe Operation

Atlantic Cement Products, Inc., Hicksville, L. I., Operates New Plant with Efficiency and Economy

THE increasing utility and popularity of concrete pipe for sewer construction, drains and similar service, is leading to marked expansion in this line of production. The growth and development, coupled with engineering skill and application, are making for distinct departures from regular practice, tending to more economical and efficient manufacture, and at the same time, to a superior product.

Notable among the recent accomplishments in this direction are those of the Atlantic Cement Products, Inc., now operating at a plant at Hicksville, Long Island, completed a few months ago. This plant presents many unique and distinctive departures in the manufacture of concrete pipe. It has been developed to a point of high efficiency through careful study of each phase of operation, from the handling of raw materials to the finished product. Highest grade concrete pipe is being produced by what may be termed a complete automatic process, with labor and other operating costs reduced to a minimum.

As generally known, there are three methods in common use for the manufacture of concrete pipe, these being (1) Pouring or casting; (2) Tamping or packing; and (3) Centrifugal. The Hicksville plant is operating under a perfected patented system, known as the Moir-Buchanan process, which is a combination of centrifugal and mechanical action. Further reference to this method of production is made later on in this article.

The raw materials used are cement, sand, gravel and grit, and for the handling of these commodities, the company has installed an interlocking mechanical system of particular interest. It was designed, furnished and erected by Davis & Averill, Inc., Newark, N. J., engineers and contractors, who specialize in installations of this character, as well as in general sand and gravel plant equipment.

Material Handling Plant

A general view of the new Hicksville plant is shown in the Fig. 1, which shows, at the extreme left, the structural framework for the material bins and equipment in the course of erection. The fundamental principle in the design and layout of the plant followed the natural trend of reducing manual labor to a minimum, with full consideration, at the same time, to eliminating to the greatest extent the possibility of interference with continuous operation through the failure of moving mechanical parts and consequent shut down of the plant.

Accordingly, it was decided to arrange for a gravity flow of raw materials wherever possible. To bring this about, it was necessary to elevate the material bins to a determined figure above the level of the plant proper. Moreover, it was essential that future expansion be considered, for with an installation of two pipe-making machines, the doubling of this capacity was scheduled in a reasonably short period of time.

The aggregates—sand, gravel and grit—are delivered at the plant by motor trucks. Here they are dumped into three receiving hoppers, one for each material,

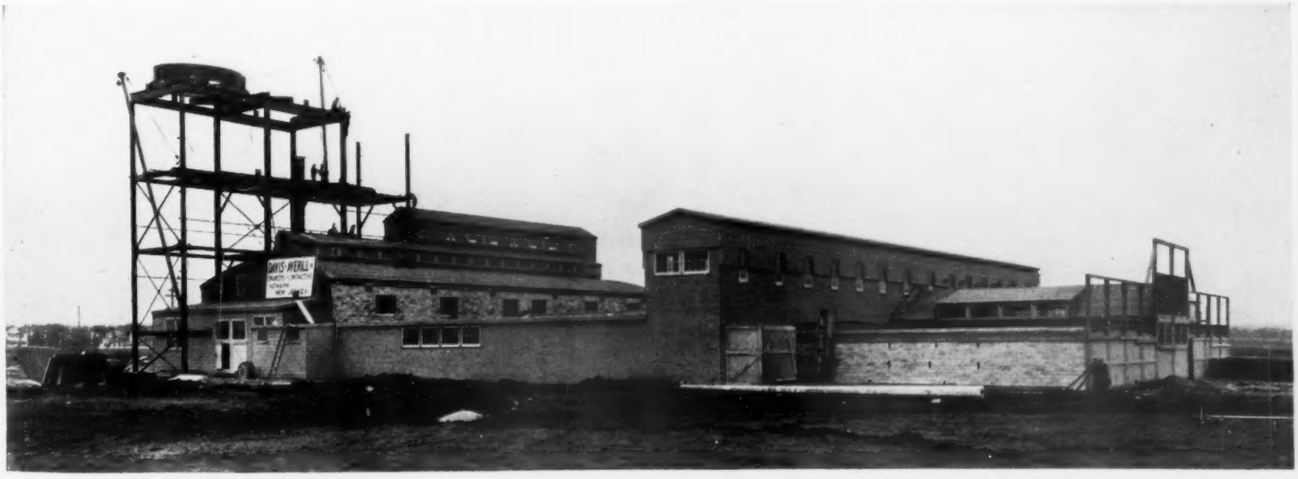


Fig. 1. The plant of Atlantic Cement Products, Inc., showing the material bins under construction

it being necessary to maintain this separation for correct mixing proportions. The hoppers form a steel-plate unit divided into three compartments, with its top at ground level, making the dumping of truck loads a simple and quick proposition. The sloping sides of the hoppers are constructed at angles determined by actual tests as the most desirable for the particular material for which used. The bottoms of the hoppers are arranged so that the contents of the three compartments can be distributed into the existing elevator, or to a future elevator to be built at the side of the present one. Thus, the hopper bottoms are provided with three extra horizontal cutaway gates and shaker rods, one for each compartment, all operated by gear drives from an operating floor above. Each hopper has a capacity of 12 cu. yd. of material.

The elevator for conveying the materials from these hoppers to the overhead storage bins is of verical bucket type, on 110-ft. centers, and encased in a dust-proof steel plate enclosure. The capacity of the elevator buckets are in excess of present plant requirements, the daily consumption now averaging about 20% of the maximum bucket rating. It was deemed advisable, however, to carry out the installation with this view to future expansion, and additionally, to provide for a safety factor against any possibiliy of causing interruption of plant operations in this quarter.

The Fig. 2 gives a sectional view of the plant, showing the top of the vertical elevator and discharge terminal (A). The delivery of the material to the three bins, indicated as B, C and D, for gravel, sand and grit, respectively, is by means of chutes and flap-gates, the former connecting with the tops of the bins, as will be noted. This gravity method of feeding the aggregates to the bins necessitated additional height to the elevator, but the success attending the operation indicates the desirability of the arrangement.

The chutes are of heavy steel design, capable of withstanding such service conditions and shocks as may develop through continuous hard usage. The flow of the material from the discharge terminal is directed and regulated by the flap-gates, referred to above, consisting of a special control system, installed between the elevator discharge box and the mouth of each of the three steel chutes. This gate system is operated by means of wire cable, controlled from the platform at the top of the hopper, shown in Fig. 2. The hopper is of steel plate construction, divided into three compartments for the handling of the respective materials.

The three overhead supply bins, B. C and D, are riveted steel construction of extra-heavy type. They are set in single file on 18-ft. centers, symmetrical about the vertical bucket elevator, as will be noted in the illustration. These bins are made up of circular cone tops, vertical center sections 16 ft. 6 in. in diameter, and sloped bottom portions. All seams are caulked carefully, to make the bin units absolutely waterproof. Each bottom section is provided with a drain pipe system and shaker rods, and with a series of outlets.

The first bin (B) is used for gravel and has a capacity of 45 cu. yd.; the center bin (C) is utilized for sand, and has a capacity of 100 cu. yd.; while the third bin (D) is employed for grit, and has a rating of 75 cu. yd. The lower portions of the bins, together with the chutes, where they extend over the roof of the main building, have been enclosed, as indicated in the illustration, Fig. 2, to retain the excess heat from the main building in the winter and thus prevent any possibility of freezing of materials.

In passing, it is interesting to note that it was at first intended, in designing this plant, to feed all of the mixing machines by gravity alone. The height to which the bins would have to be placed to accomplish this, however, was found to be excessive, and such a plan was promptly abandoned. It may be stated that a slope of at least 50 deg. from horizontal, and preferably 55 deg., is necessary for the free running of wet sand. Accordingly, in this installation, the bins are placed above the large mixers, feeding to them by gravity, with belt conveyors provided to supply the smaller machines.

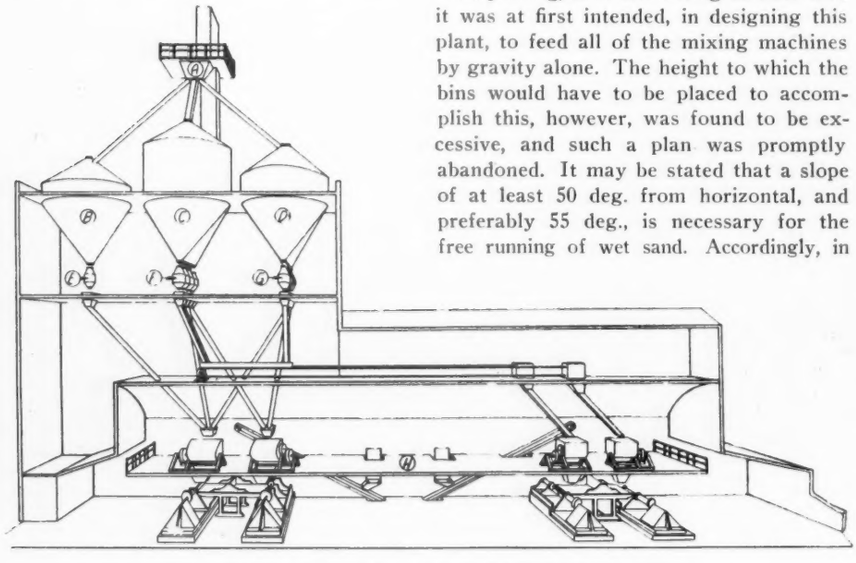


Fig. 2. Elevation of the Atlantic plant

A series of measuring boxes, noted as E, F and G, in the line illustration, are suspended from the bottom of the three main supply bins. Operation is carried out under an automatic oil pressure system. These measuring boxes, or hoppers,

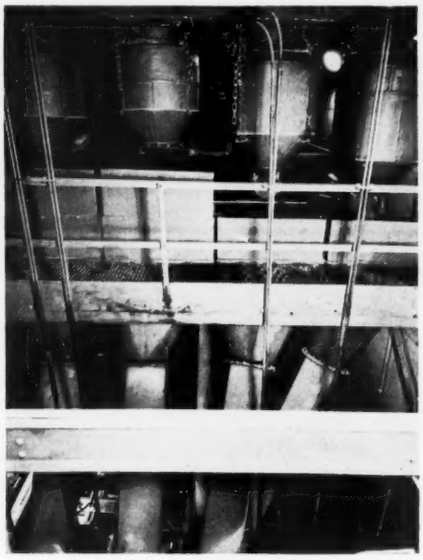


Fig. 3. Measuring hoppers, hydraulic control and spouts to mixers and conveyors

are shown, also, in Fig. 3, which shows, as well, the hydraulic control system and the gravity conveying system (in the lower part of the picture) leading to the belt conveyors and mixers. This system consists of a series of steel chutes, connecting with the bottom of the measuring hoppers; the material moves by direct travel to the nearby mixers, and by indirect flow on belt conveyors, previously mentioned, to the mixing equipment located at a distance from this source.

The measuring boxes are of volumetric character, the delivery of the material being controlled by interlocked supply and discharge valves of hydraulic type, referred to above, with other control valves at the mixers. An inspection floor is located at the bottom elevation of the measuring hoppers, as will be seen in Fig. 3, to permit easy and ready access to all parts of the bins, measuring boxes, and chutes.

The illustration, Fig. 4, shows the twin conveyor belt installation, consisting of two parallel belts, each 16 in. wide, for carrying sand and gravel, respectively, to two mixing machines located at the south end of the plant. The spouts, or chutes, leading from the measuring boxes, mentioned above, will be noticed at the rear of the picture.

A mezzanine floor has been constructed

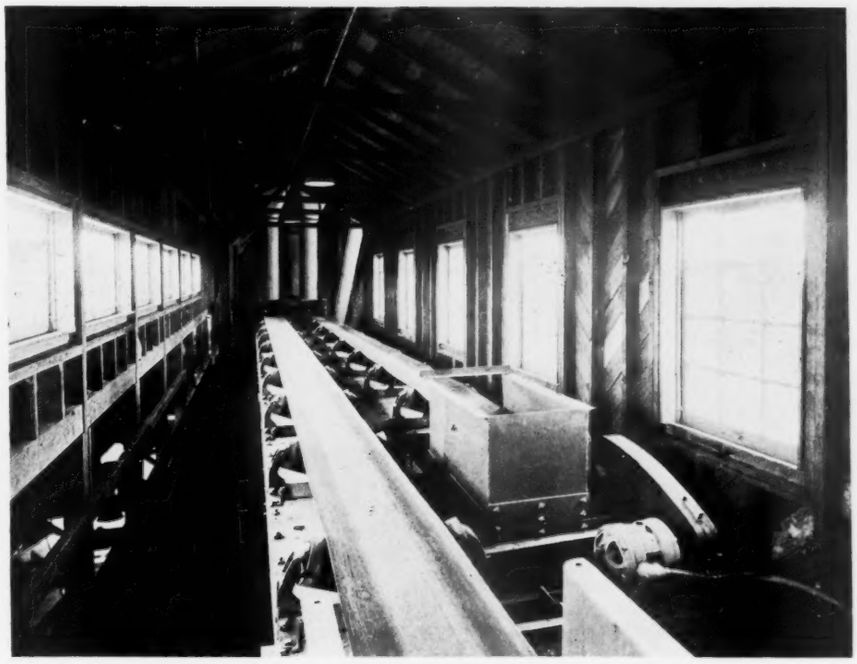


Fig. 4. The pair of belt conveyors and the spouts from the storage bins

for the mixing machines, with provision, as well, for cement storage. The cement is received and stored at the plant in paper bags. A spiral chute is installed for delivering the material in these original containers to two 18-in. inclined belt conveyors; the loading is carried out by hand labor.

The lower terminals of the conveyors are located at the center of the building at the cement stock room elevation, while the head terminal for one conveyor belt is at the mixing machines at the south end of the mezzanine floor and that for the other conveyor, at the north end of the floor, where the other mixers are situated.

Minimum Labor in Handling of Aggregates

From the time that the aggregates are received from the trucks until delivered to the bucket of the machine, only one full-time man is needed at each battery of two mixers, or two men for the four mixing units, with the part time of one man to load cement from the storage house to the belt conveyors, and the part time of one man to operate the regulating gates which determine the flow of material at the elevator head to the proper material supply bin. The operation of these last mentioned gates is controlled at the ground level, as is also the regulation of the gates opening the various receiving hoppers, as well as the starting and stopping of the vertical elevator.

Production Process

A view of the main floor of the plant, with the mezzanine floor, is illustrated in Fig. 5, and will be noticed, as well, in the line drawing (Fig. 2) at H. After the material has been placed in the concrete mixers and is ready to leave the machine, the batch is dropped through a hole in the mezzanine floor into a special receiving hopper located above the pipe-making unit. This hopper is of size and shape to allow for direct delivery to the receiving bucket of the machine, from which it is delivered to the revolving mold.

In the manufacturing process, a metal mold, finished to form the exterior pipe, is spun in a machine which resembles a lathe. The concrete is distributed to the revolving surface by means of an elongated receiving bucket, which is inserted in the open end of the mold and then dumped by a hand control. The concrete is packed and troweled, and the thickness of the shell regulated by means of a knife blade on the feeding bucket, the control being secured by its eccentric mounting on the axial shaft.

The molds are placed on the machines by means of jib cranes, as will be noted in Fig. 5, and these likewise remove the molds after the completion of the operation. When the green pipe is finished on the machine, it is taken by the crane to the first set of drying kilns. Here the pipe remains for a number of hours, and then, while in a vertical position is taken from the metal mold by means of an overhead crane installed in the kiln department. The molds are waxed before use to facilitate this operation.

Following this, the pipe sections are removed to a second set of kilns, where additional drying is carried out. From this point they are removed to the storage yard. The finished product is of uniform structure throughout, with bore trimmed to gage, and with a straight and polished surface. The pipe exceeds the requirements of the tentative specifications for reinforced concrete sewer pipe adopted by the American Concrete Institute in 1923.

In addtiion to the other equipment at the plant, there has been provided a pipe testing machine, capable of exerting a total force of 60,000 lb. over a distance of 6 ft. The automatic operation of the plant together with thorough testing, and the regulation of each batch of aggregates, has resulted in a product which is practically a turned and bored concrete pipe section of absolute uniformity and known strength.

We are indebted to the owners and patentees of this system of concrete pipe manufacture for permission to publish this article.

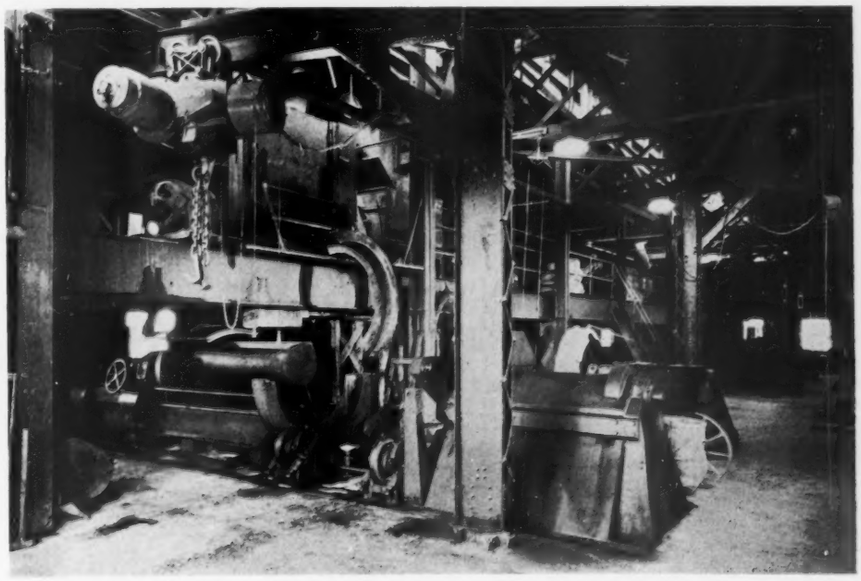


Fig. 5. The main floor of the plant showing the pipe machines and the jib crane

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Md.	.50– .75	1.35–1.45	1.15–1.25	1.10–1.20	1.05–1.15	1.05–1.10
Ft. Springs, W. Va.	.40	1.35	1.35	1.30	1.25	.....
Munns, N. Y.	.75	1.50	1.50	1.25	1.15	.....
Prospect, N. Y.	.85	1.15	1.15	1.15	1.15	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.75	1.35	1.15	.95	.85	1.20
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
West Chester, Penn.	5.00g	.....	.....	.....	.....	4.00k
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.....	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Columbia and Krause, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Cypress, Ill.	.90–1.15	.90–1.15	1.00–1.15	1.00–1.20	1.00–1.15	1.00
Davenport, Iowa (f)	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.85	1.10	.....	1.10	1.10	.....
Stolle and Falling Springs, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Greencastle, Ind.	1.25	1.05	1.05	1.05	.95	.95
Lannon, Wis.	1.00	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90–1.00	1.00–1.10	.90–1.00	.85– .90	.85– .90
Northern Ohio points	.85–1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.20	1.05	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	.45	.95	.95	.80	.80	.80
Valmeyer, Ill. (fluxing limestone)	.90–1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.....	.90	.90	.90	.90	.90
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h
SOUTHERN:						
Cartersville, Ga.	1.20	1.65	1.65	1.45	1.15	1.15
Chico, Texas	.50–1.00	1.20–1.30	1.15–1.25	1.10	1.00	.95
Cutler, Fla.	.60r	.....	.....	1.75r	1.10r	.....
El Paso, Texas	.75–1.00	1.00–1.25	1.00–1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run, screened, $1 per ton					
Olive Hill, Ky.	1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.00	1.25	1.25	.90–1.25	.90–1.25	.90–1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.75	1.25	1.25	1.25
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.40–1.65	2.00–2.30	1.80–2.10	1.40–1.70	1.40–1.70	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25
Springfield, N. J.	1.40	2.00	1.90	1.60	1.60	.....
Toronto, Canada (m)	.....	1.95	2.45	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.50	.....	1.75	1.75	1.60	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	.....	2.35	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	1.40	1.40	1.35	1.30	1.25	1.20

(a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. High calcite fluxing stone, 1.50. (g) Run of quarry. (h) Less 10c discount. (j) Less 10% net ton. (k) Rubble stone. (l) Less .05. (m) Prices at quarry. Extra charge for freight to Toronto. (n) Crusher run for ballast, .85. (p) Carloads prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yard.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh 6.00

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Blackwater, Mo.—100% thru 4 mesh 1.00

Branchton, Penn.—Analysis, 94.89% $CaCO_3$; 1.5% $MgCO_3$; 50% thru 100 mesh 3.50–5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50

Cartersville, Ga.—50% thru 50 mesh 1.50

Pulverized, per ton 2.00

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk 2.50

Cypress, Ill.—Analysis, 95% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.15; 50% thru 50 mesh, 1.15; 90% thru 50 mesh, 1.05; 90% thru 4 mesh, 1.10; 50% thru 4 mesh 1.00

Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk 3.50

Paper bags 4.75

100-lb. cloth bags 5.25

(All prices less .25 cash 15 days)

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton 6.00

90% thru 20 mesh, bulk, per ton 1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked 5.00

Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags 3.95

Bulk 2.70

Jamesville, N. Y.—Analysis, 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk 2.75

Joliet, Ill.—Analysis, 52% $CaCO_3$; 42% $MgCO_3$; 50% thru 200 mesh 2.50

Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk 2.70

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk 1.75

Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk 2.25

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00

Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh; bulk, 2.75; paper bags 4.25

Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk 1.35–1.60

Olive Hill, Ky.—50% thru 4 mesh 1.00

Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100 ..... 2.50

100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk 3.50

100% thru 4, 30% thru 100, bulk 1.50

Rocky Point, Va.—Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk 2.00

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk 2.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 90% thru 10 mesh 1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 50% thru 4 mesh	1.00
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton	1.25
90% thru 4 mesh, per ton	1.10
Dubuque, Iowa—Analysis, 54% $CaCO_3$; 38% $MgCO_3$; crusher run rescreened	.85
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.50
Kansas City, Mo.—50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.10–1.70
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.15
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.10–1.70

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill.—Analysis, 52% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh; paper bags (bags extra)	3.50
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50-5.00; bulk	3.00–3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75–2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30– .35
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
Rockwood, Mich.	2.25–3.00
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	1.75–2.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75–1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.50
Dresden, Ohio		1.25
Eau Claire, Wis.	4.30	
Estill Springs and Sewanee, Tenn.	1.35–1.50	1.35–1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	1.75–2.00	1.75
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.		1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.		.55	1.10	1.25	1.40	
Attica and Franklinville, N. Y.	.85	.85	.85	.85	.85	.85
Boston, Mass.†	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.60	.80		1.40		
Leeds Junction, Me.		.50	1.75		1.25	1.00
Machias Jct., N. Y.	.75	.65	.65	.65	.65	.65
Milton, N. H.		.50				.90
Montoursville, Penn.	1.00	.75– .85	1.00	.90	.80	.80
Northern New Jersey	.50– .60	.50– .60	1.25	1.35	1.25	
Somerset, Penn.		2.00				
South Portland, Me.		1.25	2.75			2.25
Troy, N. Y.	.50– .75*	.50– .75*	.80–1.00*	.80–1.00*		.80–1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.50	.35	.25	.45	.45	.50
Attica, Ind.			All sizes .75–.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.		.40s		.65s	.65s	.65s
Chicago, Ill.	.50	.50–1.45n	.60	.60–1.55n	.60	.60–1.90n
Chicago, Ill.	.30	.20	.30	.40	.40	.45
Columbus, Ohio		.65	.50	.65	.65	
Des Moines, Iowa		.30		1.40	1.50	
Eau Claire, Chippewa Falls, Wis.	.55	.55	.70	1.00	1.00	
Elkhart Lake, Wis.	.70	.60	.70	.70	.70	.70
Ferrysburg, Mich.		.50– .80	.60–1.00	.60–1.00		.50–1.25
Grand Haven, Mich.		.60– .80	.70– .90	.70– .90		.70– .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50				.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.75	.75	.75
Mankato, Minn.		.45g		.60–1.25h	.70–1.25	1.25c
Mason City, Iowa		.50	.85	1.25	1.25	1.25
Mattoon, Ill.			.75–.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	1.25	1.25	2.40	2.40	2.40	2.25–2.40
St. Louis, Mo. (b)	1.15e	1.15f	1.45a	1.45	1.45	1.65
St. Louis, Mo.			††1.45t	††1.45u	††1.65v	††1.65
St. Paul, Minn.	.35	.35		1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.85	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
SOUTHERN:						
Brewster, Fla.	.50	.50				
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.		.45– .50				
Ft. Worth, Texas	1.00–1.25	1.00–1.10	1.00–1.25	1.00–1.25	1.00–1.10	1.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.65– .90	.65– .90	2.25–2.50	2.25–2.50	2.25–2.50	2.25–2.50
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.30	.30	1.00	.95	.70	.70
WESTERN:						
Kansas City, Mo.	.70– .80	.70– .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10– .40	.10– .40	.50–1.00	.50–1.00	.50–1.00	.50–1.00
Oregon City, Ore.			All grades range from 1.00 to 1.25 per cu. yd.			
Otay, Calif.		.35– .40	.50– .60	.50– .60	.50– .60	.50– .60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			.40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.	.75*					
Chicago, Ill.	1.25m			.35		
Des Moines, Iowa				.60		
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Falls, Wis.					.65	
Fort Worth, Texas						.70r
Gainesville, Tex.					.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85–2.00		1.50–1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
York, Penn.	1.10	1.00				

*Cubic yd. †Delivered on job by truck. (a) ⅝-in. down. (b) 1½- to ¼-in., 1.65. (c) 2½-in. and less. ‖By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago. (r) Pit run. (s) Plus 15c for winter loading. (t) Fine and regular binder. (u) Coarse, torpedo, also roofing. (v) Coarse binder. ††2% discount if paid by 15th of month following delivery.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.75	2.75	2.75	.50–2.75	1.75–2.00	1.75–4.00	
Beach City, Ohio	1.75–2.00	1.75–2.00		1.50	1.75		
Dresden, Ohio	1.25–1.50	1.25–1.50	1.50–1.75	1.00–1.25			
Eau Claire, Wis.						3.00–4.30	
Elco and Murphysboro, Ill.	Water-floated ground silica per ton in carloads—18.00–31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35–1.50	
Franklin, Penn.	1.75–2.25	1.50–1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10–1.50	1.25–2.00	2.00			2.75–3.00	
Klondike, Mo.	2.00			2.00			
Massillon, Ohio	2.25	2.25		2.50	2.50		
Michigan City, Ind.				.30–.35			
Montoursville, Penn.				1.50–1.60			
New Lexington, Ohio	2.25	1.75					
Ohlton, Ohio	1.75	1.75		2.50	1.75	1.75	
Ottawa, Ill.	1.25	2.25	2.25	2.25	1.25	3.50	2.00
Red Wing, Minn. (d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50–5.00†	3.50–5.00†	3.50–5.00†	
Silica, Mendota, Va.	Potters flint, 8.00–10.00g. Polishing sand, 1.75–2.00						
Utica and Ottawa, Ill.	.40–1.00f	.40–1.00f	.75–1.00	.40–1.00f	.60–1.00f	2.23–3.25	1.00–3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*–2.00h	1.50*–2.00h		1.50*–2.00h			
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00–4.25. (f) Crude and dry. (g) Also 12.00; building sand, 1.75–2.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y., Erie and Dubois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.00	1.00		1.00			
Western Pennsylvania	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.45*	1.45*	1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.90
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.†		.50*		1.15*	.90*	.90*	

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

					Ground burnt lime,		Lump lime,	
EASTERN:	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Blk.	Bags	Blk.	Bbl.
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.							5.00	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[12]
Williamsport, Penn.	10.00–11.00	8.50–9.00	8.50–9.00		7.00	9.00	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50–9.50[7]	8.50–9.50[7]	8.50–10.50[7]	8.00	9.25	7.00	1.40[5]
CENTRAL:								
Afton, Mich.						10.00	7.50	
Carey, Ohio	11.50	7.50	7.50		8.00		8.00	1.50
Cold Springs, Ohio		7.50	7.50					
Gibsonburg, Ohio	11.50				8.00	10.00		
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	11.50							
Milltown, Ind.		8.50–10.00		10.00[8]			8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Scioto, Ohio	11.50	7.00	7.00	8.00	8.25	.62½	7.00	1.50
Sheboygan, Wis.		10.50					9.50	2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	7.50	7.50	12.50	8.00	10.00[9]	8.00	1.50[3]
SOUTHERN:								
El Paso, Texas							7.00	1.50
Frederick, Md.		8.00–9.50	8.00–9.50			9.50[15]	7.00[15]	
Graystone & Landmark, Ala.	12.50	9.00		12.50			7.50	1.35
Keystone, Ala.	19.00	9.00	9.00	9.00			7.50	1.35
Knoxville, Tenn.	19.00	9.00	9.00	9.00			7.50	1.35
Ocala, Fla.	14.00	11.00	11.00	14.00				.65[16]
WESTERN:								
Kirtland, N. M.							15.00	
Los Angeles, Calif.	15.00	14.00	12.00	18.00			13.50	
San Francisco, Calif.	19.00–19.50	16.00–17.50	12.50–13.70	19.00	13.00[19]	.90[17]	13.00[19]	1.85[17]
Tehachapi, Calif.[13]	10.80		6.75[11]	12.00			10.30	
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9] 80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00–12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] to 1.70. [17] Less credit for return of empties. [18] 90-lb. sacks. [19] Also 14.50. [22] To 9.00. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Utica and Ottawa, Ill.	1.00–3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Ground talc (20-50 mesh), bags 7.00– 8.50
- Ground talc (150-200 mesh), bags 7.25–15.00
- Pencils and steel crayons, gross, 5-in., .80–1.75; 4-in. .50– 1.25

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 7.50–8.50a
- Same, including 50-lb. bags 8.50– 9.50

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 63.00

Dalton, Ga.:
- Crude talc (for grinding) 4.00
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel worker's crayons, per gross 1.00– 2.00

Emeryville, N. Y.:
- (Double air floated) including bags:
- 325 mesh 14.75
- 200 mesh 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh 15.50–20.00

Henry, Va.:
- Crude (mine run) 3.50– 4.50
- Ground talc (150-200 mesh), bags 8.75–14.00

Joliet, Ill.:
- Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00
- Crude talc 3.75

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00–30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00–15.00

(a) Bags extra.

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70% 3.50– 4.50

Gordonsburg, Tenn.—B.P.L. 65-70% 4.25– 4.75

Mt. Pleasant, Tenn.—B.P.L., 77% 6.50

Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00

Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00– 9.00

Ground Rock
(2000 lb.)

Centerville, Tenn.—B.P.L. 65% 8.00

Gordonsburg, Tenn.—B.P.L. 68% 3.50
- B.P.L. 72% 4.50

Mt. Pleasant, Tenn.—Lime phosphate:
- B.P.L., 73%, 98% thru 100 mesh, 90% thru 200 mesh, 80% thru 300 mesh 11.20
- B.P.L. 72% 5.00–5.50

Twomey, Tenn.—B.P.L. 65% 8.00

Wales, Tenn.—B.P.L. 65% 11.00

Florida Phosphate

(Raw Land Pebble)
(Per Ton)

Florida—F.o.b. mines, gross ton, 68/66%
- B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

New York City, N. Y.—Per lb.,
- Cut mica (1½x2) 1.60
- Cut mica (8x10) 26.00

Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .06
- Scrap, per ton, carloads 20.00

Rumney Depot, N. H.—Per ton,
- Mine run 300.00
- Clean shop scrap 25.00
- Mine scrap 22.50–24.00
- Roofing mica 37.50
- Punch mica, per lb. .12
- Cut mica—50% iron Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, English cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Brighton, Tenn.—Pink marble chips	§3.00	§3.00
Crown Point, N. Y.—Mica spar		b9.00
Davenport, Ia.—White limestone, in bags	6.00	6.00
Easton, Penn.—Royal green	16.00–18.00a	
Harrisonburg, Va. — Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash		11.00–18.00
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white	10.00	10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		5.50– 7.50
Phillipsburg, N. J.—Royal green granite		15.00–18.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		¶7.90–‖8.95
Wauwatosa, Wis.		20.00–32.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00
Whitestone, Ga.		*10.00

†C.L.; L.C.L. 16.00. ¶C.L. ‖L.C.L. (a) Including bags. *Per 100 lb. (b) 60c per 100-lb. bag.

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140-mesh	19.00
Buckingham, Ore. — White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y. — Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6%; bulk (crude)	9.00
East Hartford, Conn. — Color, white, 40 mesh to 200 mesh	15.00–28.00
East Liverpool, Ohio — Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50–14.00; bulk	11.00–12.50
Pulverized, 95% thru 200 mesh; bags, 19.73–23.50; bulk	15.75–22.50
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk	18.00
(Bags 15c extra.) Crude feldspar, bulk	12.00
Tennessee Mills—Color, white; analysis, K_2O, 10%; Na_2O_3, 3%; SiO_2, 68%; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Colo, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50– 8.00

Chicken Grits

Afton, Mich.—(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.	12.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass.—(Limestone)	‡7.50–*9.00
Davenport, Ia.—(Limestone), bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—Per ton, including sacks: Feldspar	14.00
Gypsum	7.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	7.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, 8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags. (a) F.o.b. Middlebury, Vt.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	11.00
Anaheim, Calif.	10.50–11.00
Barton, Wis.	10.50g
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50–13.50
Detroit, Mich.	j13.00–16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00–19.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00–11.00
Lake Helen, Fla.	9.00–12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50–15.00*
Pontiac, Mich.	15.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00–22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50–14.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada (f)	15.00†e
Wilkinson, Fla.	12.00–16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc. 10 days. ‖Dealers' price. (a) Less 50c disc. per M, 10th of month. (d) 5% disc., 10th of month. (e) Delivered. (f) F.o.b. yard, 12.50. (g) Delivered Milwaukee, 13.00. (j) Also 14.00.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Atlanta, Ga.		2.36	3.51¶
Baltimore, Md.		2.25–2.65	3.55¶
Birmingham, Ala.		2.00	3.44¶
Boston, Mass.	.68¼	2.23–2.73e	3.27¶
Buffalo, N. Y.	.62½	2.00–2.50	3.40¶
Butte, Mont.	.90¼	3.61	
Cedar Rapids, Iowa		2.24	
Charleston, S. C.		2.25–2.65d	3.58¶
Cheyenne, Wyo.	.64	2.56	
Chicago, Ill.		2.05–2.45	3.35¶
Cincinnati, Ohio		2.22–2.62	3.52¶
Cleveland, Ohio		2.24–2.64	3.54¶
Columbus, Ohio		2.22–2.62	3.52¶
Dallas, Texas		1.80	3.39¶
Davenport, Iowa		2.24	
Dayton, Ohio		2.24–2.64	3.54¶
Denver, Colo.	.63¾	2.55	
Des Moines, Iowa		2.14	
Detroit, Mich.		1.95–2.35	3.25¶
Duluth, Minn.		2.04	
Houston, Texas		1.90	3.63¶
Indianapolis, Ind.	.54¾	2.09–2.49	3.39¶
Jackson, Miss.		2.44	3.54¶
Jacksonville, Fla.		2.60b	3.79¶
Jersey City, N. J.		2.13–2.53	3.43¶
Kansas City, Mo.	.45½	1.82	3.22¶
Los Angeles, Calif.	.62½	2.50	
Louisville, Ky.	.55½	2.57	3.47¶
Memphis, Tenn.		2.04–2.44	3.34¶
Milwaukee, Wis.		2.20–2.60	3.50¶
Minneapolis, Minn.		2.12–2.22	
Montreal, Que.		1.60	
New Orleans, La.	.45½	1.82	3.61¶
New York, N. Y.	.60¾	1.93–2.43	3.33¶
Norfolk, Va.		1.97	3.27¶
Oklahoma City, Okla.	.57¼	2.29	3.69¶
Omaha, Neb.	.54	2.16	3.56¶
Peoria, Ill.		2.22	
Philadelphia, Pa.		2.11–2.61	3.51¶
Phoenix, Ariz.		3.91*	
Pittsburgh, Penn.		2.04	3.34¶
Portland, Ore.‡		2.40–2.90a	
Reno, Nev.‡		3.41a	
Richmond, Va.		2.32–2.80	3.62¶
Salt Lake City, Utah	.70¼	2.81	
San Francisco, Calif.‡		2.71a	
Savannah, Ga.		2.80c	3.65¶
St. Louis, Mo.	.48¾	1.95–2.35	f3.25¶
St. Paul, Minn.		2.12–2.22	
Seattle, Wash.		2.65	f3.50†
Tampa, Fla.		2.40	4.11¶
Toledo, Ohio		2.20–2.60	3.50¶
Topeka, Kans.	.50¼	2.01	3.41¶
Tulsa, Okla.	.53¼	2.13	3.53¶
Wheeling, W. Va.		2.12–2.52	
Winston-Salem, N. C.		2.29–2.69	3.59¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

Albany, N. Y.	.43¾	1.75	
Bellingham, Wash.		2.10	
Buffington, Ind.		1.80	
Chattanooga, Tenn.		2.45*	
Concrete, Wash.		2.35	
Davenport, Calif.		2.05	
Hannibal, Mo.		1.90	
Hudson, N. Y.		1.75	
Leeds, Ala.		1.65	
Lime and Oswego, Ore.		2.50‡	
Mildred, Kan.		2.35	
Nazareth, Penn.		2.15	
Northampton, Penn.		1.75	
Richard City, Tenn.		2.05	
Steelton, Minn.		1.85	
Toledo, Ohio		2.20	
Universal, Penn.		1.80	

NOTE—Add 40c per bbl. for bags. *Includes sacks. †10c disc., 10 days. ‡10c disc., 15 days. (a) Includes cloth sacks returnable at 10c each. (b) 24c bbl. refund for paid freight bill. (c) 35c bbl. refund for paid freight bill. (d) 40c bbl. refund for paid freight bill. (e) 45c bbl. refund for paid freight bill. (f) "Velo" cement, including cost of paper bag. ¶ "Incor" Perfected prices per bbl. packed in paper sacks.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	.....	.....	.....	.....	.....	15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Blue Rapids, Kan.	1.70	4.00	.....	.....	.....	.....	10.00	.....	.....	.....	.....	15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00–11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	4.50–5.00	13.10–14.00	5.00	.....	7.25	.....	.....	.....	.....	25.00
Douglas, Ariz.	.....	.....	6.00	14.50	15.00	.....	18.00	.....	30.00	.....	.....	.....	.....
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	.....	.....	.....	19.00	.....	15.00	20.00
Grand Rapids, Mich.	2.65	4.00	6.00	6.00	9.00	9.00	17.65	.....	22.75	19.00	12.00	15.00	18.00
Gypsum, Ohio	1.70–3.00	4.00	6.00	7.00–9.00	9.00	9.00	19.00	7.00	24.50	19.00	.....	15.00	20.00–25.00
Los Angeles, Calif.	4.90	7.50m	7.50m	8.40	9.00	.....	10.00	.....	36.00u	9.00	19.00	21.00	27.50
Medicine Lodge, Kan.	1.70	4.00	.....	.....	.....	.....	.....	.....	15.00	.....	.....	15.00	20.00
Oakfield, N. Y.	2.50	.....	.....	5.50	6.00	6.00	.....	5.50	.....	.....	.....	15.00	25.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....
Seattle, Wash.	6.00	10.00m	10.00m	13.00m	14.00m	.....	15.00	.....	.....	15.00	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) Hardwall plaster, 13.00; casting, finishing molding, 14.00; (b) Calacoustic plaster, 10.00 at mill; (c) Plaster lath; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks; (v) retail 35.00.

Market Prices of Cement Products and Slate

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00		
Cement City, Mich.		5x8x12–55.00¶	
Chicago District‖	180.00–210.00a	230.00–260.00a	280.00–330.00a
Columbus, Ohio	13.00		
Detroit, Mich.	.15– .17†		.24–.26†
Forest Park, Ill.	21.00*		
Grand Rapids, Mich.	15.00*		
Graettinger, Iowa	.18– .20		
Indianapolis, Ind.	.10– .12a		
Los Angeles, Calif.	4x8x12–5.00*		
Olivia and Mankato, Minn.	9.50b		
Somerset, Penn.	.18– .20		
Tiskilwa, Ill.	.16– .18†		
Yakima, Wash.	20.00*		

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00– 40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00– 50.00
Camden & Trenton, N. J.	17.00	
Chicago District	14.00	
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Klinker	10.00	
Ensley, Ala. ("Slagtex")	9.00–12.00	
Eugene, Ore.	25.00	35.00– 75.00
Forest Park, Ill.		37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50– 65.00
Los Angeles, Calif.	12.50	
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.		14.00– 23.00
Omaha, Neb.	18.00	30.00– 40.00
Pasadena, Calif.	10.00	
Philadelphia, Penn.	14.75	
Portland, Ore.	17.50	23.00– 55.00
Mantel brick—100.00–150.00		
Prairie du Chien, Wis.	14.00	22.50– 25.00
Rapid City, S. D.	18.00	30.00– 35.00
Waco, Texas	16.50	32.50–125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

*40% off List.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60
Pasadena, Calif. (Stone Tile):	
3½x4x12, per 100	3.00
3½x6x12, per 100	4.00
3½x8x12, per 100	5.50
Tiskilwa, Ill.;	
8x8, per 100	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	
3½x6x12, per M	50.00
3½x8x12, per M	60.00
Prairie du Chien, Wis.:	
5x8x12, per M	82.00
5x4x12, per M	46.00
5x8x6 (half-tile), per M	41.00
5x8x10 (fractional), per M	82.00
Yakima, Wash. (Building Tile):	Each
5x8x12	.10

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened 200 mesh, $7.50 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton.
Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue grey, $7.50 per ton.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—Oxford gray Buckingham	14.62	18.13	23.40	26.33	32.14	40.95
Bangor, Penn.—No. 1 clear	8.50–13.00	22.00	26.00	30.00	40.00	50.00
No. 1 ribbon	7.50– 9.25	18.00	22.00	26.00	36.00	46.00
Medium clear	8.50– 9.50	.....	.....	.....	.....	.....
No. 2 ribbon	6.00– 6.50	.....	.....	.....	.....	.....
Chapman Quarries, Penn.—No. 1	8.50–11.25	.....	.....	.....	.....	.....
Medium	7.75– 9.00	.....	.....	.....	.....	.....
Artistique	.....	16.00	23.00	26.00	32.00	40.00
Fairhaven, Vt.—						
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	.....	.....	.....	.....
Pen Argyl, Penn.	10.50	16.00	23.00	27.00	37.00	46.00
Albion mediums	8.00–9.00	18.00	22.00	26.00	36.00	46.00
Cathedral gray	10.50–12.50	18.00	25.00	29.00	39.00	48.00
No. 1 ribbon	8.00–8.50	18.00	22.00	26.00	36.00	46.00
Textural	15.00	24.00	30.00	36.00	48.00	60.00
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Cement Building Tile

Cement City, Mich.:	
5x8x12, per 100	5.00
Chicago District (Haydite):	
4x 8x16, per 100	14.00
8x 8x16, per 100	22.00
8x12x16, per 100	30.00
Columbus, Ohio:	
5x8x12, per 100	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12, per 100	8.00
Longview, Wash.:	
4x6x12, per 100	5.00
4x8x12, per 100	6.25
Mt. Pleasant, N. Y.:	
5x8x12, per M	78.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00
Waukesha, Wis.—Drain tile, per ton	8.00

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich.	4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off																
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., 18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.17	.22	.30	.40	.55	.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.90	.....	1.20	.....	.....	1.91	.....	2.60	3.60	4.35	5.93	6.83	7.70
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced (c) Delivered on job; 5% discount, 10th of month. †21-in. diameter. ‡Price per 2-ft. length.

Contract Prices

THE city of Milwaukee, Wis., will pay $2.02 a barrel for cement used in city construction work, the central board of purchases decided recently when it accepted a bid of the Froemming Corp. for supplying the city during 1929.

The bid is 14 cents lower than all other bids received because all of the other bids came from members of the Milwaukee Building Materials Co-operative Association, forming a trust that had agreed to to increase the price over last year's figures.—*Milwaukee* (Wis.) *Leader.*

Canadian Limestone Producers Ask Protective Tariff

CANADIAN STONE PRODUCERS, chiefly in the provinces of Quebec and New Brunswick, appeared before the Advisory Board on Tariff and Taxation at Ottawa recently to ask for a duty of $1 per ton against all limestone and marble coming in from the United States. The application is made by J. Sutton Clark, of St. George, N. B., and by the Winnipeg Supply and Fuel Co., Winnipeg, through D. C. Henderson. In opposition to this application was a lengthy memorandum from the Canadian Pulp and Paper Association, submitted by John Bain, of Ottawa. In anticipating the opposition of pulp and paper manufacturers the stone producers declare that a duty of $1 per ton on limestone "would mean very little, if any, to the cost of paper, as a duty of $1 a ton would not mean more than 10c. per ton to the cost of paper." Pulp mills, the stone producers' brief says, use 350 lb. of limestone to each ton of paper produced.

The present tariff allows limestone and marble to come into Canada free. The American duty is $1 a ton and the Canadian producers claim they are at a further disadvantage as to freight charges, the stone producers in the United States can ship to Canadian places of use cheaper than Canadian producers. Objections are also raised to this class of material being listed as "refuse stone" when in reality they claim it is a high calcium limestone.

The trade figures published by the Government do not show the sales of limestone rock for pulp purposes separately but, taking the Canadian industry as a whole and quoting from the last published figures, 6,438,379 tons of limestone, valued at $7,145,917, were produced in Canada in 1927. The imports for that year were $520,000, of which $213,609 represented the value of refuse stone, used chiefly for iron and steel, road making and pulp purposes.

Following is a list of the applicants: J. O. Lapierre, 1831 Descarrieres street, Montreal, P. Q.; Deschambeault Quarry Co., St. Marc des Carrieres, Quebec; Gingras and Frere, Ltd., St. Marc des Carrieres, Quebec; Olivier Gauthier, St. Marc des Carrieres, Quebec; Naud and Darveau, St. Marc des Carrieres, Quebec; Silver Granite Co., 190 St. Jacques street, Montreal; Montreal Cut Stone Co., 800 Bellechasse, Montreal; Stone and Quarry, Ltd., 800 Bellechasse, Montreal; A. Guilbault and Fils, 6965 St. Denis, Montreal; Canada Crushed Stone Co., Ltd., C. M. Doolittle; Queenston, Quarry Co., Ltd., C. M. Doolittle; Lynchke and Ganquish, Saskatoon, Sask.; Allen and Grant, 401 Youville street, St. Boniface, Man.; Tyndall Quarry Co., Ltd., Erin street, Winnipeg, Man.; Gillis Quarries, Ltd., Spruce and Roberts, Winnipeg, Man.; Western Stone Co., Ltd., 406 Canada Building, Winnipeg, Man.; Alex. Young, Regina, Sask.; E. F. Timms, box 372, Kalsom, B. C.; R. M. Reed and Son, Graniteville, Quebec.

Northern Interests Purchase Shenandoah Lime Co.

PITTSBURGH and Philadelphia interests have acquired another large lime plant south of Winchester, Va., it was learned recently, the plant and all equipment of the Shenandoah Lime Co., Strasburg Junction, having been sold by State Senator R. S. Wright and associates to the Rockdale-Corson Lime Co., a corporation headed by R. L. James, Pittsburgh, and Philip Corson, Philadelphia. The same company was recently formed to take over the Linville plant of the Rockdale Lime Co., and the Shenandoah lime plant at Strasburg.—*Lynchburg* (Va.) *News.*

New Law Overlooks Gypsum Construction in New York

MEMBERS OF THE Gypsum Institute, Inc., and representatives of the United States Gypsum Co. met December 18, 1928, at the Hotel Commodore, New York City, to discuss the action of the temporary New York State Tenement House Law Revision Committee which apparently overlooked specifying gypsum construction other than for ordinary plastering purposes.

The meeting resulted in the commission correcting the oversight and gypsum as a structural material will be incorporated in the revised building code.

On December 3 the Gypsum Institute and other gypsum manufacturers drew up a communication expressing the thought that the omission of all reference to gypsum as a construction material should be corrected, and pointed out that gypsum was not an untried material and its use in many of New York's largest buildings made them qualify as fireproof. The meeting on December 18 was a result of this resolution.

Belgian Cement Plants Active, But Competition Keen

THE cement industry in Belgium has maintained capacity production since the beginning of the year, but profits have been reduced by the competition between Belgian plants. Efforts toward cartelization have, in general, failed, but a satisfactory agreement was reached concerning sales in the Netherland market. In view of the failure to form a European cartel, efforts now tend toward arrangements for reaching a local agreement in each country before international negotiations are again taken up seriously. Despite competition, most plants are expected to show reasonable profits, and the output for 1928 is estimated at close to 3,000,000 tons.—*U. S. Commerce Reports.*

Southwestern's El Paso Cement Plant to Increase Capacity

STEADILY increasing volume of business and in anticipation of still further prosperity next year, the Southwestern Portland Cement Co. is spending $195,000 on a program of expansion and improvements, at its El Paso, Texas, plant.

The capacity of the plant will be increased 200 bbl. a day, chiefly through dust recovery. The present capacity is 3000 bbl. daily and the plant has been running full capacity since early last summer.

Incidentally, the new refineries coming into El Paso—Pasotex Petroleum Co., Nichols Copper Co. and the Texas Co.—have an indirect bearing on the enlargement of the plant. Aside from that, the improvements being made mean placing the production on a more economic basis.

"This present year," H. E. Nichols, superintendent of the Southwestern Portland Cement Co., stated, "has been our biggest production year since the plant has been built. We are looking forward to the new year with the greatest degree of optimism."

On the electrical precipitation plant, which recently went into operation, the company spent $75,000. This plant collects the dust that has been going out of the kiln stacks. Such was formerly both a nuisance in the smelter neighborhood and a considerable money loss. The loss was figured at approximately 15,000 tons a year. Now the dust goes back into the plant to be burned.

Work has started on the extension of the power house and this will cost $100,000. A new Westinghouse turbine, which will take the place of the old equipment, has been purchased. Delivery is expected January 5. It is hoped that by the middle of February the new power plant will be in operation.

The burning zone of the third kiln at the plant is being increased 50% at a cost of $20,000. This work on the other two was performed some time ago.

W. R. Blair, sales manager of the company, holds optimistic views regarding the future.—*El Paso* (Texas) *Herald.*

Indiana Cement Mill Reduces Price

THE INDIANA PORTLAND CEMENT CO., Greencastle, Ind., announced a reduction of 10c. per barrel in the base price of "Lone Star" cement at its Indiana mill, effective Monday, December 10.

George E. Pierson, manager of the company stated:

"This reduction is made necessary in order to protect our markets and assist our dealers against the intense competition created by the displacement of domestic cement at seaboard markets through the importation of foreign cement.

"Foreign cement is manufactured at wage scales which are below those prevailing in this country and transported at exceedingly low ocean rates, enabling the foreign cement to reach our market at prices less than the American manufacturer can afford to meet. Portland cement is on the free list, placing domestic cement in direct competition with the low cost, imported product. This depressed price on the Atlantic and Gulf seaboard, must seek a market in the interior, resulting in intensive competition and affecting unfavorably prices over a large area."—*Richmond* (Ind.) *Item.*

Otto Kuehne, Jr., Heads Missouri Valley Land Assn.

THE Missouri Valley Sand and Gravel Association held their annual convention in Kansas City, Mo., on December 11 and 12, the two days being taken up in transacting the business of the association, which is composed of 28 sand and gravel companies in Kansas, Oklahoma and Missouri, according to John Prince, secretary-treasurer of the association.

Otto Kuehne, Jr., general manager of the Kansas Sand Co., Topeka, was elected to head the organization for 1929. Other officers elected at the meeting were: Lawrence Daly, of the Daly-Osage Sand and Gravel Co., Nevada, Mo., vice-president, and John Prince, of the Stewart Sand Co., Kansas City, Mo., was re-elected secretary-treasurer.

Members of the executive committee were Harry Moore, Missouri River Sand and Gravel Co., Boonville, Mo.; Frank Peck, Peck-Thompson Sand and Gravel Co., Kansas City, Mo.; Fred H. Gades, Consumers Sand Co., Topeka; Noble Dunn, Arkansas City Sand Co., Arkansas City, Kan.; Earl Williamson, Tulsa Sand Co., Tulsa, Okla. T. G. Wear, of Topeka, was elected as business manager of the association.

H. E. West, of Muskogee, was the retiring president of the association.

Eight New Members Added

Eight new members were added to the association at the Kansas City meeting. These were the Victory Sand and Gravel Co., Topeka; W. A. Johnston Sand Co., Topeka; Bowersock Co., Lawrence; De Soto Sand Co., De Soto; Browing Sand Co., Lawrence; Lawson Sand Co., Kansas City, Mo.; Blue River Sand and Gravel Co., Irving, Kan.; Independent Sand Co., Wichita.

Two delegates will represent the Missouri Valley association at the national convention to be held in Cleveland, Ohio, January 9, 10 and 11. These are Mr. Kuehne and Jim Chandler, of the Price Sand Co., Tulsa, Okla.

The first evening of the convention was featured by a theater party and the meeting closed with a dinner dance at the Kansas City Athletic Club.

Registration

Harry E. Moore, Missouri River Sand and Gravel Co., Boonville, Mo.
O. W. Knight, River Sand Co., Topeka, Kan.
Paul Sherman, Victory Sand and Stone Co., Topeka, Kan.
J. C. Ayers, Blue River Sand and Gravel Co., Blue Rapids, Kan.
Otto Kuehne, Jr., Kansas Sand Co., Topeka, Kan.
W. E. Rogers, Arkansas River Sand Co., Sand Springs, Okla.
F. W. Peck, Peck-Thompson Sand Co., Kansas City, Mo.
Ted Wear, Consumers Sand Co., Topeka, Kan.
G. E. Williamson, Tulsa Sand Co., Tulsa, Okla.
H. B. Thompson, American Sand Co., Kansas City, Mo.
C. J. Feeney, Pioneer Sand Co., St. Joseph, Mo.
A. E. Fisher, Glasgow Sand Co., Glasgow, Mo.
N. C. Dunn, Arkansas City Sand and Gravel Co., Arkansas City, Kan.
F. H. Gades, Consumers Sand Co., Topeka, Kan.
R. R. Jackman, Bowersock Mills, Lawrence, Kan.
J. M. Chandler, Price Sand Co., Tulsa, Okla.
Lawrence A. Daly, J. A. Daly-Osage Sand and Contracting Co., Nevada, Mo.
E. C. Dresser, Dresser Sand Co., Leavenworth, Kan.
John Prince, Stewart Sand Co., Kansas City, Mo.
W. A. Johnson, Topeka, Kan.
E. L. Kirkham, Stewart Sand Co., Kansas City, Mo.
Ed Winkler, Lawson Sand Co., Kansas City, Mo.
C. B. Laird, Eagle Iron Works, Des Moines, Iowa.
L. M. Chambers, De Soto Kaw River Sand Co., De Soto, Kan.
E. J. Tuttle, De Soto Kaw River Sand Co., De Soto, Kan.
W. H. K. Bennett, W. H. K. Bennett Co., Chicago, Ill.
George H. Cook, Stewart Sand Co., Kansas City, Mo.
W. J. Stewart, Stewart Sand Co., Kansas City, Mo.

International Cement Mill at Spokane, Wash., Has Fair Year

CONDITIONS in the cement industry have shown a slight improvement in the last two years, although the demand is far below the producing capacity of the mills, according to R. K. Neill, president of the International Portland Cement Co., which has a large plant east of Spokane, Wash.

"The capacity of our plant is 600,000 bbl. a year but we have seldom sold more than half of that quantity," he said. "West-bound shipments are made to Yakima, Wenatchee, northern Idaho and to other Inland Empire points."

The International Portland plant occupies five acres and provides employment for 50 men. Its quarries at Port Rock, near Bayview, Idaho, and Powell, seven miles north of Marcus, increase the number of employes to 110. The equipment here includes sacking and storage departments and shipping yards. The plant has connections with all railroads.

Mr. Neill stated that he was devoting his time and energy toward the development of the Spokane plant for the best interests of the Inland Empire territory and that neither he personally nor the International Portland Cement Co. is interested in any other cement plant.

He returned recently from the west coast of Mexico where he passed much of seven weeks in the inspection of mining properties in which he, with his Spokane associates, is heavily interested. Mr. Neill reported a rapid improvement in Mexican conditions and an outlook for large developments by United States interests on the west coast.—*Spokane* (Wash.) *Spokesman Review.*

American Ceramic Society Meeting

THE American Ceramic Society will hold its annual meeting February 4, 5, 6 and 7, 1929, at the Hotel Stevens, Chicago, Ill. Monday, February 4, will be devoted to business of the association, research programs and reports by representatives of the associations meeting concurrently during the week. The three remaining days will be devoted to division meetings and joint meetings with other associations.

The Art Division will present 15 papers, the Enamel Division, 16; the Glass Section, 15; Heavy Clay, 18; Terra Cotta, 8, and the White Ware Division, 23 papers. Many of these papers will be of interest to ROCK PRODUCTS readers, some of which are listed as follows:

"Greater Efficiency in Tunnel Dryers," by W. D. Richardson; "Stoker Application to the Car Tunnel Kiln," by Frank Hartford; "The Use of the Aeroplane Propeller in Waste Heat Drying," by Marion Blair; "Relation Between Temperature Curves and Expansion Curves in the Setting of Plaster," by Westendick and Williams; "Experiments with Lepidolite," by H. E. Davis; "Further Results on the Investigation of Feldspars," by G. W. Wray; "Pyrophyllite, a New Ceramic Material," by G. R. Sheldon; "Completely Automatic Tunnel Kilns," by J. T. Jans; "Feldspar," by C. W. Parmalee, and "Progress Reports on the Use of Andalusite and Some Related Materials," by Riddle and Twells.

Motorists Need 20-Ft. Road, Engineers Show by New Interesting Tests

DO YOU KNOW that you drive your car or truck by instinct? You do, for engineers of the Bureau of Public Roads have been watching you. They have made observations to see how far from the edge of the pavement you drive and what you do at curves and on down grades.

Having marked off pavements into 1-ft. sections, the engineers, by watching the right rear wheels of passing vehicles, find that on straight and level roads of various width from 14 to 24 ft., with shoulders in fair condition, passenger car drivers habitually maintain a distance of from 1½ to 4 ft. between the outer wheel and the edge of the pavement. Truck drivers operate somewhat nearer the edge, but prefer not to approach closer than 1½ ft. Drivers will sacrifice clearance between their own and passing vehicles rather than drive closer to the edge than they instinctively feel is safe.

The bureau's observations indicate that pavements less than 18 ft. wide are decidedly too narrow since they provide no clearance for passenger car or trucks operating in the usual paths. While the 18-ft. width is apparently great enough for passenger cars in two-lane traffic, it is not quite wide enough for trucks. The 20-ft. width gives ample clearance for trucks and is not excessive for automobiles.

In moving down hill on light grades, traffic moves slightly toward the center of the road. Light down grades do not suggest reduction of speed, hence traffic takes the precaution of moving slightly away from the edge of the pavement. No such tendency was observed on heavy grades where the speed is reduced, and the instinctive fear of the pavement's edge is lessened.

In rounding horizontal curves, traffic, in general, shifts toward the inside edge, but the trucks shift their courses toward the inside of the curve less than passenger vehicles. Under all circumstances, truck drivers are found to adhere more closely to the edges of the pavement than operators of passenger vehicles.

Traffic moving on the outside of the curve shifts its course farther in the direction of the inside than traffic moving in the opposite direction, which is limited in its choice of a course by the proximity of the edge of the pavement. Unless, therefore the pavement is widened on the curves, the normal straight road clearance between the two lines of vehicles is reduced.

The used width of a pavement may frequently be considerably less than its apparent width, the observations disclosed. On straight roads, as well as on curves, the outer foot of the surfaced section is sometimes totally ineffective because of a bad shoulder. A closely set guardrail, a steep crown, a bad gutter, or an uneven, bumpy condition of the surface near the edge will cause the driver instinctively to seek the center of the road. In one case, a 24-ft. pavement was found to have an effective width of not more than 20-ft. because of the abutments of an overhead railroad bridge which were crowded close to the edge of the pavement.

Smooth, white concrete shoulders at the edge of a black surface seem to lure the traffic toward the side. Center lines on straight roads, as well as on curves, exert a marked separatory influence.

New Canada Hydrating Plant Starts Operation

THE FIRST hydrated lime manufacturing plant in the Maritimes is now operating in Saint John, New Brunswick, at the lime kilns of the Restigouche Co., Ltd. Two kilns will be used exclusively to supply stone to the hydrator and two others to supply the lump lime.

Wisconsin Concrete Products Association Meeting at Milwaukee

THE following program has been prepared for the seventh annual Wisconsin Concrete Products Association which meets at the Plankinton hotel, Milwaukee, Wis., January 10 and 11, 1929:

THURSDAY, JANUARY 10

9:00 A.M. Registration and Getting Acquainted.

10:30 A.M. Address by President.
Report of Secretary.
Reports of District Representatives.

11:30 A.M. Appointment of Committees.

THURSDAY, JANUARY 10

1:30 to 5:00 P.M. "Putting Promotion in Motion"—W. D. M. Allan, manager, Cement Products Bureau, Portland Cement Association, Chicago. Bob Smythe, Cement Products Bureau, Portland Cement Association, Chicago.
A discussion of Manufacturing and Promotional Methods Used by Concrete Products Manufacturers.

COMMITTEE MEETINGS

7:00 P.M. Meeting—Cast Stone Manufacturers of Wisconsin.

FRIDAY, JANUARY 11

10:00 A.M. Manufacture and Sale of Concrete Products. A series of 10 minute papers on problems that enter into the manufacture and selling of various concrete products.
"What of the Small Factory?"—W. G. Rathke, Seyberth Neuser Co., Eau Claire, Wis.
"Some New Ideas on an Old Subject"—Arthur W. Grube, Sheboygan Brick Co., Sheboygan, Wis.
"From the Bottom to the Top"—Wm. H. Devos, Wm. H. Devos Co., Inc., Milwaukee, Wis.
"A Square Block for a Round Hole"—Arthur Sorenson, Julius Sorenson and Sons, Racine, Wis.

FRIDAY, JANUARY 11

1:30 P.M. Manufacture and Sale of Concrete Products (continued).
"Trimming Our Sales"—A. E. Broker, Badger Cement Tile Co., Plymouth, Wis.
"Putting Over Something New"—C. O. Gochnauer, Gochnauer Concrete Products Co., Appleton, Wis.
"Getting the Most With What You Have"—Fred C. Simmonds, Cincrete Corp., Milwaukee, Wis.
"Increasing the Family"—L. E. Schwalbe, Economy Concrete Products Co., Wauwatosa, Wis.

3:00 P.M. Business Session. Election of Officers.

7:00 P.M. Annual Banquet and Entertainment, Hotel Plankinton.

Northwestern Portland Cement's New Officers

H. L. McCOURTIE of Jackson, Mich., founder, was elected president of the Northwestern States Portland Cement Co. at the annual meeting at Mason City, Ia., December 18. Col. Hanford MacNider of Mason City was chosen chairman of the board of directors.

New Mississippi Barge Line Will Handle Sand and Gravel

OPERATION of a new, privately owned barge line on the upper Mississippi is in prospect, with the filing of copies of Delaware articles of incorporation by the Mississippi Barge Corp. with the secretary of state of Minnesota.

The concern has capitalization of $750,000, of which not more than $50,000 is to be invested in Minnesota. Fred Ossanna, of Minneapolis, is president, James P. Schmauss is secretary, and Edward M. Burke, 1134 First National-Soo Line building, Minneapolis, was appointed Minnesota agent for the concern.

Material to be hauled by the line will be chiefly bulk commodities, such as coal, iron ore, gravel and sand, the articles state.—*Minneapolis* (Minn.) *Journal.*

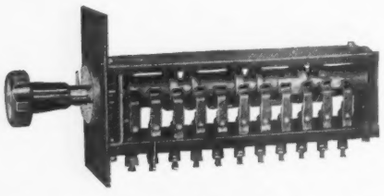
Fertilizer Trade Practice Conference

AT THE ATLANTA MEETING of The National Fertilizer Association a resolution was unanimously adopted requesting a conference with the Federal Trade Commission on behalf of the fertilizer industry. This request has been granted and the meeting will probably be held in Washington some time between January 10 and 15.

New Machinery and Equipment

New Instrument and Control Switches

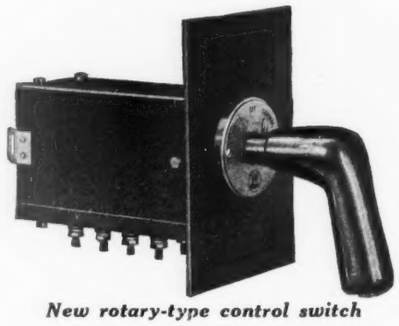
THE Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., has recently put on the market a new type of switch used for connecting any instrument or group of instruments selectively to various circuits as may be required for metering, synchronizing, or for other switching functions. These switches are of the rotary type, and are strong, durable, well insulated, and



Control switch with cover removed to show contacts

easily operated. They are said to be especially adapted to mounting in small space, and present a uniform appearance.

The turning of the switch handle operates a shaft on which are mounted various contact-making segments. These segments make or break contact with stationary fingers supported on an insulated base. This base is a part of the supporting structure of the switch with suitable top and sides serving to com-



New rotary-type control switch

pletely enclose the switch parts, and to complete the switch structure.

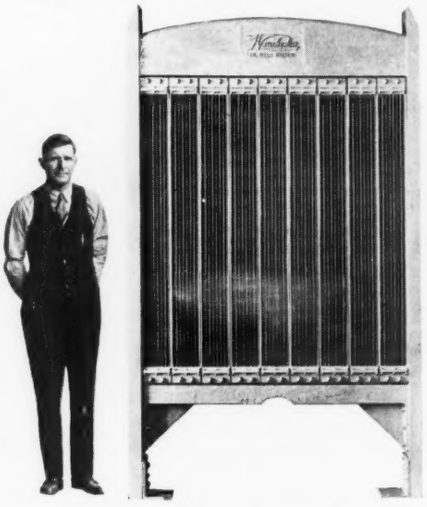
This switch is readily mounted on any commercial thickness of panel. Its terminal board is such as to facilitate any of the accepted methods of switchboard panel wiring. All terminals are numbered, and in making connection the number of the stud should correspond to the number given in the wiring diagram. A Micarta sliding cover on each side makes the housing dust-tight. These covers are easily removable to allow access to all parts. All internal metal parts are nickel-plated.

These switches are made in six standard lengths. The many combinations required are assembled from a relatively small number of standard segments and insulating arc-resisting spacers. All switches are insulated for 600-v. service a. c., or d. c. The contacts will carry 10 amperes continuously and will open 5 amp. under normal conditions.

Switches of this type can be mounted 3 in. apart horizontally and 5¼ in. vertically between center lines.

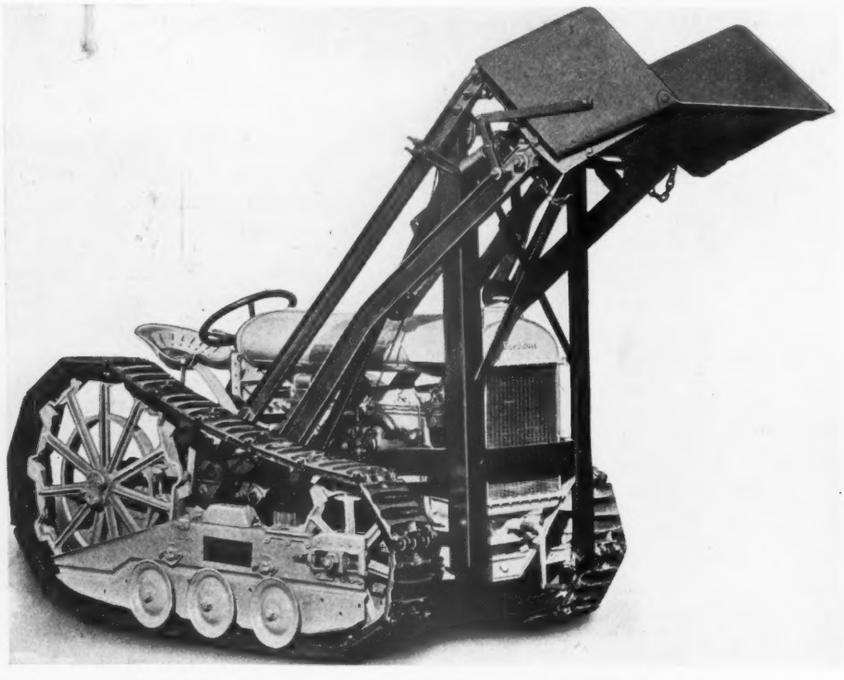
Large Radiators for Heavy Duty Service

THE Young Radiator Co. of Racine, Wis., has announced a new type of radiator for engines with horsepower ranging from 200-



Large-size, heavy-duty radiator

300. This unit is a very large one and suitable for cooling these engines for industrial work, in tropical climates and under conditions similar to those in the oil fields where the work is of the most severe type. It is built especially for contracting, oil field work and where the conditions render the common automative type core impractical to use. These radiators are built in several sizes, depending upon the horsepower they are required to cool and the conditions for their use, and are furnished either with or without fan equipment.



High-lift loader mounted on full-crawler-equipped tractor

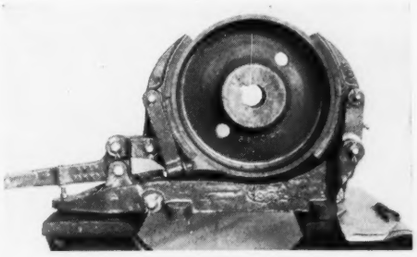
New Lines of High-Lift Loaders and Low-Lift Shovels

THE TRACKSON CO., of Milwaukee, Wis., have announced the addition of a line of loaders and shovels to its present line of full-crawlers. The new shovel has a 3½-ft. lift, being designed for low-lift work, and is suited to excavating and digging trenches, and also to backfilling. It is stated that it will replace from four to ten men on a job, and will handle up to 160 yd. per day. The high-lift loader has a lift of 7 ft.

and will fill a truck or wagon in a few minutes time. It is suitable for contractor's work, quarry use, in industrial plants, and similar operations. Both machines are built to stand long hours and days of constant service, the company states. The equipment is adapted to mounting on either wheel- or crawler-equipped Fordson tractors.

New Mechanically-Operated Shoe-Type Brake

THE Electric Controller and Manufacturing Co., Cleveland, Ohio, has announced a new mechanically-operated brake of the



Mechanically-operated shoe-type brake

shoe type intended for the bridge drives of electric traveling cranes, electric hoists and other applications requiring foot-operated or hand-lever operated brakes. The new brake is a modification of the company's electrically-operated Type WB body, and practically all of the wearing parts are interchangeable with the latter brake.

The tendency toward the use of anti-friction bearings on various types of equipment has resulted in increasing the amount of work to be performed bv the brake. This has necessitated improved brake design with increased wearing qualities of the friction linings. The Type WB brakes is equipped with unusually thick molded asbestos brake shoes requiring renewal only after very long periods, the company states.

New Variable Speed Hoists

THE Construction Machinery Co., of Waterloo, Iowa, has recently placed a new variable speed hoist on the market in various sizes. The new hoist was designed by Fred T. Kern, of Milwaukee, Wis., and is known as the "Kern" hoist.

The new hoist has two speeds on both the inhaul and retrieve drum, giving a better application of power and higher efficiency. The drum shafts are stationary, and are stated to be guaranteed for the life of the hoist. Four identical high speed clutches working on a special countershaft eliminate the chronic clutch trouble which is sometimes found in hoist equipment, the company claims.

Kern hoists are now being produced in ½-yd., 1-yd., 1½-yd. and 2-yd. capacities.

Improved Electric Hammer

AN improved electric hammer has recently been brought out by the Black and Decker Co., Towson, Md., for use in small jobs of breaking concrete or drilling holes around an industrial plant. It is claimed that the new hammer strikes 2300 sharp blows every minute, with sufficient force to drill a 1-in. hole in concrete at the rate of 3 in. a minute, or in brick at 8 in. a minute. The improved electric hammer weighs 15½ lb. and comes in a compact kit with compartments for chucks, turning wrenches and drills. It can be connected at any electric light socket.

Electric hammer drill has improved features

Easton Cars to Be Made in Canada

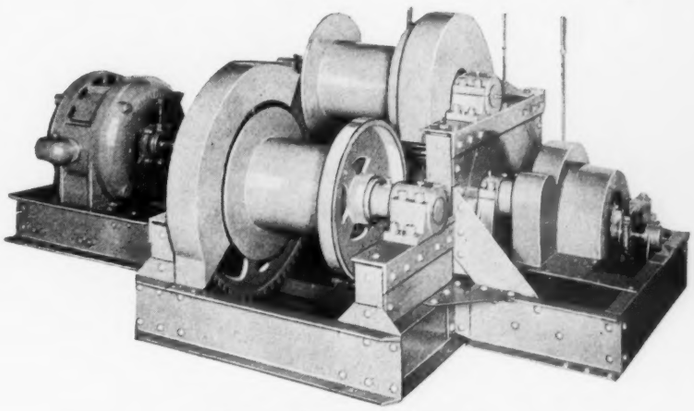
THE EASTON Car and Construction Co. of Easton, Penn., is now represented in Canada by the Canadian Car and Foundry Co., of Montreal, Que. The Canadian Car and Foundry Co. will not only act as exclusive sales representative for Easton cars, but also the engineering and plant facilities of both companies will act in perfect co-operation. Industrial cars may be built in Canada or the United States as may be most advantageous to the customer in price or delivery.

New Testing Sieve

THE Newark Wire Cloth Co., Newark, N. J., has recently announced a new testing sieve, equipped with a special improved joint. An important feature of the new sieve is that the inside corner is rounded instead of sharp, thus eliminating the part which, the manufacturers claim, was hard to keep clean and interfered with its accuracy.

In the new sieve, all the soldering is done on the outside instead of the inside. When the wire cloth becomes so worn as to need replacing, it can readily be changed by melting the old solder off and soldering the new cloth on with new solder. It is claimed that this can be done without distorting the cloth, thus insuring uniformity of the meshes when the cloth is being installed.

These sieves are made in 3-, 5-, 6-, 8-, 10- and 12-in. diameters and in accordance with the U. S. Bureau of Standards specifications, adopted as standard by the American Society of Testing Materials in 1926. The company carries a stock of the 8-in. size which has been certified by the Bureau of Standards.



New variable speed hoist

New testing sieve with special features

News of All the Industry

Incorporations

Virginia Lime and Stone Products, Inc., Staunton, Va., $15,000. R. L. James.

Wythe County Mineral Corp., Wytheville, Va., $10,000. S. B. Campbell.

Diamond Alkali Co., Wilmington, Del., $18,500,000. Clays, stone, salts and coal.

Wet-Mix Concrete Co., St. Louis, Mo., $150,000. Dan J. Boone, 5448 Milentz St., St. Louis, Mo.

Interstate Cement Corp. has changed its name to the Century Cement Corp., Cleveland, Ohio.

Hudson Sand Co., Newburgh, N. Y., has disorganized.

Los Angeles Portland Cement Co., Wilmington, Del., $1,600,000, with 30,000 shares common.

National Marl and Humus Co., Berrien Springs, Mich., $5,000. To quarry and deal in marl.

Petrus Cement Corp., Wilmington, Del., 1000 shares, no par value. George Carrell, New York, N. Y.

Duntile Manufacturing Co., 12850 Evergreen Ave., Detroit, Mich., $50,000. To manufacture concrete blocks.

Western Hills Sand and Gravel Co., Cleveland, Ohio, 250 shares no par value. Agnes Georgi, Frank J. and Edward B. Ulrich.

Miller Concrete Products Co., Stamford, Conn., $50,000. C. M. Miller, Water St., and others, all of Stamford.

Interstate Sand and Gravel Corp., Norfolk, Va., maximum capital 500 shares no par value. John Twohy, president, Norfolk, Va.

Dixie Soapstone Products Corp., Arlington, Va. Fredrick J. Kandt, president. To quarry and deal in soapstone.

Bierne Gravel and Sand Co., Little Rock, Ark., $50,000. J. J. Ball, C. M. King and S. M. Garwood of Little Rock.

Iron River Sand and Gravel Co., Iron River, Wis., $50,000. To build a washing plant at Moon Lake.

Pacific Aggregates, Inc., San Francisco, Calif., 1,200,000 shares of no par value. W. Frank Garby, San Francisco; Leo C. Blum, Alameda; L. H. Castilio, Berkeley, and others.

Alabama Oolitic Stone Corp., to increase capital stock to $250,000. Preferred stock of 250 shares, par value $100, to be issued. A. D. Creighton, J. S. Dunbar, Jr., and others.

Coat O. Marble, Inc., 35 E. Wacker Drive, Chicago, Ill., 200 shares no par value. Manufacture and sell building materials of all kinds. C. L. Banker, H. Smith and E. Westphal.

Midwest Marble Co., 4551 Fifth Ave., Chicago, Ill., 400 shares common of no par value. To manufacture and sell marble. Alex H. Widiger, Bradley F. Marthens and Mathew Bloomer.

Chicopee Sand and Gravel Co., Chicopee, Mass., 100 shares, no par value. Lawrence F. Fortier, president and treasurer, 57 Elm St., Chicopee, and Arthur R. Fortier.

Southerland Gravel Co., Osyka, Miss., $100,000. Incorporated in Louisiana. C. J. Thomas, Osyka, and S. A. Gano, Maison Blanche Bldg., New Orleans, La.

Abrasives Products, Inc., Boston, Mass., $100,000; 1000 shares preferred, $100 each; 5000 shares common, no par value. Winfield C. Towne, president and treasurer, 232 Bay State Rd., Boston, and Helen M. Towne.

Quarries

Blackwater Quarries Co., Boonville, Mo., which has not been operating recently due to floods, has resumed operations.

Sturgeon Bay Co., Sturgeon Bay, Wis., it is announced, expects to gradually increase its capacity to 3,500,000 tons per year.

Saluda Crushed Stone Co., Saluda, S. C., expects to have its new plant in operation in January, 1929. The old plant was destroyed by fire last May.

Stolz Marble and Granite Works, O. E. Stolz, acquired 100 acres granite quarries from Dealers' Granite Corp., Llano, Tex., quarries under new ownership to be known as Premier Granite Corp.

Vermont Marble Co.'s purchase of one-half interest in the Consolidated Yule Marble Co. has been confirmed by Jacob F. Smith, Buffalo, N. Y., according to *Denver* (Colo.) *Rocky Mountain News.*

The Hartshorne Quarry and Crushed Stone Co., of Hartshorne, Okla, has a $1,000,000 contract with the Rock Island railroad to supply ballast for lines in Louisiana and eastern Arkansas.

Thompson Limestone Co., Williston, according to the *Lake City* (Fla.) *Reporter,* is erecting a crushing plant and ten or twelve houses. T. J. Getsen of Fort White is in charge of construction.

Rock Island Railroad, according to the *Princeton* (Mo.) *Telegraph,* is willing to contract for road ballast using rock from the old quarry near Princeton, as that stone has been found to be satisfactory for such use by the railway company.

Ohio Cut Stone Co.'s plant at South Amherst, Ohio, was destroyed by fire caused from a short circuit, according to C. R. Yansen, Cleveland, manager of the plant. The equipment lost included buildings, cranes and miscellaneous stone-cutting machines, all valued at $200,000.

New Castle Lime and Stone Co., Connellsville, Penn., operating the Dunbar bluestone quarry, is reported by the *Pittsburgh* (Penn.) *Sun-Telegraph* as making their plant permanent by installing new machinery costing $250,000. The number of men employed will be increased from 50 to 200.

American Black Gabbro Co., Mellon, Wis., is progressing rapidly with the quarry development work and is reported endeavoring to purchase the Ashland blast furnace property and docks, intending to use the buildings for stone storage purposes, according to a *Wisconsin Trade News Bureau* dispatch.

Fuller Construction Co., Nevada, Mo., leased the county-owned crushing plant and will probably operate it with its own crew. The contract provdies that the Fuller company pay the county 8 cents per cubic yard for all crushed rock going into highway and yardage to be figured on highway measurements plus 30%, which is considered as due to compression. About 30 men are employed at the crusher.

Sand and Gravel

Home Builders Store, Carlsbad, Calif., recently purchased the Oceanside Rock and Sand Co.

A. O. Smith Corp., said to be operators of a temporary gravel pit at Livingston, Wis., suffered a loss through the accidental death of an employee on November 29. One workmen was buried in a gravel slide, following the use of explosives to loosen the material.

Huntington, W. Va.—Extension of two permits to dredge sand and gravel in this district was granted recently by Major E. D. Ardery, U. S. engineer for the Huntington district. H. A. Carpenter's permit to dredge sand and gravel in the Ohio river between Huntington and Vanceburg, Ky., was extended until December 31, 1931. The permit of the Buckeye Sand and Gravel Co., of Beverly, Ohio, to dredge sand and gravel in the Muskingum river between Marietta and Zanesville and in the Ohio river between Parkersburg and Wheeling, was also extended until December 31, 1931.

Koch Sand and Gravel Co., Evansville, Ind., loaded the first of many barges with building stones for dam No. 50, below here on the Ohio river, a few days ago. The shipment towed in the Koch company barges to Caseyville, Ky., half way between Evansville and Paducah, comprises 150 carloads, one of the largest one-order shipments ever handled by the Evansville company. It took the Koch company six days to complete the towing. The stones will be dropped in the sluiceways and river bed at dam No. 50. Bert Koenig, of the Koch Sand and Gravel Co., was selected recently to represent Evansville at a banquet given by Graham Brothers at Detroit, Mich. The Graham Brothers, who are associated with the Graham-Paige Corp. are building a two million dollar automobile body plant in Evansville.

Charles R. Tintinger, Cascade, Mont., business man and rancher, who operates a gravel pit at Tintinger Siding, seven miles above Cascade, is making many improvements there. He is arranging new sets for his dragline and crushing plant so that he can operate two units at once. He is stripping the soil from the top of the gravel bed by means of a dragline and is filling in excavated portions. Two carloads of new machinery have been unloaded for the improved plant. The gravel is noted for its quality about this part of the state. The weight of 3200 lb. per cu. yd. is high and that is why the Montana Power Co. used it in the Black Eagle dam. It is rumored that the new Morony dam is to get its gravel from the Tintinger pit. The bed is 25 ft. thick and is 98% gravel in its raw state. As the gravel comes up to the loader it is washed to remove all foreign material and for purification. The oversize gravel is sent through a crusher. Draglines run out 300 ft. from the loader and bring the gravel into the machine All machinery is operated by electricity.

Cement

Kansas Portland Cement Co., Bonner Springs, Kan., was host recently to a party of 54 students and faculty members of the University of Kansas.

Kentucky Cement Corp., Frankfort, Ky., is reported ready to begin construction of its new plant near Frankfort. Machinery is reported to have been ordered.

Louisiana Portland Cement Co., New Orleans, La., suffered some delay to its towboat "Lone Star" when it was recently forced to come into Biloxi, Miss., harbor for engine repairs, leaving three barges at the Isle of Caprice.

Republic Portland Cement Co., San Antonio, Tex., has awarded contracts for supplying and installing a complete dust-collecting system throughout the plant now under construction, to Northern Blower Co., Cleveland, Ohio. "Norblo" units are to be used in all departments.

North American Cement Corp. is reported to have shut down production at its Olsen, N. Y., plant for one month. Flooded New England markets, together with the holidays, are said to be the reason for the closing. It is said that the corporation hopes to open up with an increase in the output of cement after the shutdown.

Trinity Portland Cement Co., Dallas, Tex., has decided to make a number of changes in the dust-collecting system at its Houston plant. As a start a complete "Norblo" system will be installed in the finish grinding mill. The rest of the departments have also been checked over in order to bring them up to the most modern standards of efficiency.

Northwestern States Portland Cement Co., Gilmore City, Iowa, has been running full capacity. This plant has been in operation since early in June and employs about 100 men. Practically all work in the stone quarry has stopped for the present. According to Superintendent H. Webster's report, this plant will continue to operate the entire winter.

Dewey Portland Cement Co., Davenport, Iowa, was host to 75 representatives of cement product companies in Iowa, Wisconsin, Illinois and Minnesota, December 10. The group spent the day inspecting the plant in Linwood, and the visitors were entertained at a luncheon and later dinner in the Hotel Blackhawk. F. E. Tyler, Kansas City, president of the company, and Dan Servey, head of the Haydite Cement Products Co., Kansas City, were speakers at the informal gatherings.

Atlas Portland Cement Co., Independence, Kan., according to the local press, has had the best year in the history of its existence. Recently it has been shipping out large orders and finds the stocks on hand low and demand brisk. The plant is operating at capacity, and present indications are that the business will continue good throughout the remainder of the winter, at least. The large amount of road and bridge construction has helped to make the cement business good. Construction work of all kinds, which has been large, moved large quantities of cement, and the Independence plant is enjoying its full share of this business.

Pacific Coast Cement Co. commenced operations at its new plant at Seattle, Wash., December 26. With some ceremony and the usual difficulty attendant on the operation of getting a blowtorch to burn, they kindled a fire under the main boiler and started the big plant to working. On that day, also, the first lime rock, which comes from Alaska, was ground. The plant is under the management of W. H. Green, plant superintendent. Vice-president N. D. Moore stated that this $3,000,000 venture is only the first of a number of similar enterprises contemplated by this company. The plant will employ 150 workers, will have a $250,000 yearly payroll and an annual production of 1,200,000 bbl. of "Diamond" portland cement.

Ideal Cement Co., Denver, Colo., has purchased the San Luis Southern Railroad, running from Blanca on the Denver and Rio Grande Western to Jarosa, Colo. Had it not done so it is likely the road would have been junked. Now it has filed incorporation papers in New Mexico, signed by Charles Boettcher, Claude K. Boettcher, R. J. Morse, George T. Kearns, all of Denver, and R. B. Ramsey of San Acacio, Colo., for the purpose of extending the railroad from Jarosa to Questa, N. M.,

The "BIG MILL"

INSTALLED IN THE PLANT OF
THE ATLAS PORTLAND CEMENT CO.
NORTHAMPTON, PA.

THE owners have just naturally formed the habit of referring to this Allis-Chalmers "Mastodon" Compeb as the "Big Mill" and by this name it probably will be always known.

It is producing from 4500 to 5000 bbls. Atlas Cement daily. Atlas officials insisted upon a design which would give uniformity of product, large capacity and power consumption commensurate with capacity and fineness.

By well designed intermediate screening devices, the fineness is controlled within narrow limits resulting in very uniform output and fineness, and the entire absence of any coarse material in the finished cement.

ALLIS-CHALMERS

MILWAUKEE, WIS. U.S.A.

When writing advertisers, please mention ROCK PRODUCTS

22 miles. The new line will cross the Sunshine valley, where many big irrigation projects are to be carried out, and with this work done the section will grow, and as it is a rich agricultural section, the Ideal and the citizenry will be mutually rewarded.

Giant Portland Cement Co., Egypt, Penn.; executives and members of the sales force and representatives of the personnel of the company's plant at Egypt met in the Americus Hotel, Allentown, Penn., December 4, at the annual sales meeting. Among those at the gathering were C. F. Conn, president; F. J. Jiggens, treasurer; R. W. Lesley, a member of the board of directors; O. D. Harvard, general superintendent of the company's mills at Egypt and Lesley, Penn., and S. N. Peters, general sales manager. A luncheon was held at 12 o'clock, followed by a conference and sales talk during the afternoon. Following a dinner another business session was held. Salesmen from all through the company's territory, which extends from Maine to Virginia, were present.

Virginia Portland Cement Co., Norfolk, Va.; importation of foreign cement has caused a reduction in the price of cement manufactured in Virginia, it was stated by Dwight Morgan, vice-president of the Virginia Portland Cement Corp., Norfolk, who announced a reduction of 10c. per barrel in the base price. He said this change in the cost was effective now. According to Mr. Morgan, foreign cement is manufactured at wage scales far below those prevailing in this country and transported at exceedingly low ocean rates, enabling the foreign cement to reach our market at prices less than the American manufacturers can afford to meet.

Cement Products

Northwest Concrete Products Association is preparing to hold its annual convention at Eugene, Ore., on January 25 and 26

Cast Stone Manufacturers of Wisconsin, meeting in Milwaukee in December, reported a substantial increase in the sale and use of cast stone throughout the state in 1928.

Sigurd H. Bo, Rochester, N. Y., has begun the manufacture of a new plaster and cement with a cinder base which is reported to be revolutionary in its fire-resisting quality. Mr. Bo has obtained basic patents on cinder block, and together with the Straub patents, these are now controlled by the National Building Units Corp.

Gypsum

Gypsum companies in the Northwest have interested the farmer granges in buying land plaster in car lots and the farm organizations distribute the gypsum to their members. Considerable savings to the farmer are effected by this method of buying.

The United States Gypsum Co. tugboat used on the construction of the new 6000-ft. pier at Alabaster, Mich., was disabled recently and the tugboat "Stephen Cole," captained by the owner, John McKay, left Alpena, Mich., to replace the disabled boat.

Morton C. Tuttle has secured a permit for the erection of a one-story brick building for the United States Gypsum Co. at 48th St. and Schuylkill river, at an estimated cost of $120,000. The building, of fireproof construction, will be on a lot 94x198 ft. and will be used for manufacturing and storage purposes.

Federal Gypsum Co.—That the construction of large calcining plants in Chicago by the United States Gypsum Co. is causing Iowa producers some uneasiness is evident from the *Centerville Iowegian* (Iowa), which reports that one plant is operating on specialties practically entirely, as the Chicago hardwall market price is so low they cannot enter that territory.

Lime

Tennessee Cement and Lime Co. has moved its general offices from Murfreesboro to Summitville, Tenn.

The Oro Grand Lime and Stone Co., Los Angeles, Calif., is moving its general offices from the Douglas Bldg. to 341 Foothill Rd., Beverly Hills, Calif.

R. N. Horton Lime Co., Richlands, W. Va., will start a new lime kiln in operation early in January, 1929. The kiln is the first one of four to be built, according to the *Bluefield* (W. Va.) *Telegraph*.

Standard Lime Co., Gold Hill, Ore., is making arrangements to reopen the plant to supply lime for agricultural and paper manufacturing purposes. D. N. Littler is president.

Blue Diamond Materials Co., Los Angeles, Calif., will shortly install a "Norblo" dust collecting system in its grinding and packing department. The units will be installed by the Northern Blower Co., Cleveland, Ohio, under the direction of L. D. Gilbert, chief engineer of the Blue Diamond Materials Co.

Agricultural Limestone

Atlas Portland Cement Co., Independence, Kan., is shipping limestone to farmers near Carney for agricultural purposes.

Silica Sand

Eastern Silica and Chemical Co. acquired Winchester Glass and Sand Co., Winchester, Va., and tracts of glass sand lands west of city; company plans erecting pulverizing plant to produce silica.

Miscellaneous Rock Products

National Soapstone Co., West Jefferson, N. C., will develop soapstone deposits on Bald Mountain.

American Mineral Products Co., Inc., Walpole, N. H., awarded contract for a one-story, 60x230-ft. feldspar grinding plant on Gold River to Aberthaw Construction Co., 80 Federal St., Boston, Mass. Estimated cost $160,000.

Cornet Phosphate Mining Co., Cornet, Fla., planning to open new mine on property, on Mulberry-Bartow road, Polk county; will apply to Polk county commissioners for permission to lay spur track from Seaboard Air Line Railway to property.

American Potash Co., care of Chamber of Commerce, Odessa, Tex., is planning development of potash properties near city, with raw material equipment for capacity of about 2000 tons per day, refinery, machine shop, boiler plant and other structures, to cost more than $200,000.

Personals

Phil Heim has been appointed sales manager of agricultural limestone of the Carbon Limestone Co., Youngstown, Ohio.

Val Baskette, formerly of the wholesale department of the Blue Diamond Co., Los Angeles, Calif., has started the Co-operative Builders Supply Co., Phoenix, Ariz., handling a general line of building supplies. These include stucco, plaster, rock, sand, gravel, wallboard, cement, lime, hydrated lime, metal corners, etc.

Harrison J. Behr, for more than 12 years associated with the B. F. Goodrich Rubber Co. and for the past seven years connected with the organization of the United States Rubber Co., has joined the sales organization of the Boston Woven Hose and Rubber Co., Boston, Mass., as a special field representative.

Sam D. Clinton, for the past three or four years district representative of the Monolith Portland Cement Co., with headquarters in Portland, Ore., has been appointed resident manager of the Monolith Portland Midwest Co.'s interests in Denver, Colo. Mr. Clinton is a graduate in civil engineering of the University of Nebraska, and was formerly connected with the Concrete Pipe Co. at La Grande, Ore.

Phillip Morrison, of the Pioneer Sand and Gravel Co., Seattle, Wash., has been elected president of the Seattle Building Material Dealers' Association.

Frank H. Smith, president of the Lawrence Portland Cement Co., New York City, and president of the Portland Cement Association, was instrumental in establishing the new Elks' Home at Plainfield, N. J., where he lives. He was Exalted Ruler of the local lodge of Elks from 1912 to 1915.

Manufacturers

Gruendler Crusher and Pulverizer Co., St. Louis, Mo., announce that final touches on its new plant were completed December 1 and the entire Gruendler organization is now housed within its walls. The new plant has everything to promote the efficient manufacture of crushing, pulverizing, grinding, screening and conveying machinery and equipment, including a laboratory or experimental room where special problems are studied.

Morris Machine Works, Baldwinsville, N. Y., manufacturers of Morris centrifugal pumps, has moved its Detroit office to 730 Fisher building.

W. S. Tyler Co., Cleveland, Ohio, manufacturers of woven wire screens, etc., has acquired a 15-acre site at St. Catherine, Ont., for the erection of a plant to supply its Canadian trade.

Harnischfeger Corp., Milwaukee, Wis., has enlisted the services of the Ed. P. Phillips Machinery Co. of Richmond, Va., as new district agents for the Virginia territory, to handle its complete line of "P&H" excavating equipment.

E. I. duPont de Nemours and Co.'s subsidiary, the Grasselli Chemical Co., has purchased 20 acres of land at Ecorse, Mich., on the Michigan Central railroad, for the construction of a plant to manufacture sulphuric acid and other chemicals.

Sullivan Machinery Co., Chicago, at a special meeting of its directors, unanimously elected Arthur E Blackwood president of the company to succeed the late Frederick K. Copeland. Mr. Blackwood has been with the Sullivan Machinery Co. for the last 32 years.

Continental Motors Corp., Detroit, Mich., announce the appointment of Sid Harris as industrial sales engineer in the East. Mr. Harris comes to Continental Motors with a wide knowledge of the industrial field, his past experience including market research, sales promotion and sales engineering both in the manufacturing and publishing fields.

National Flue Cleaner Co., Inc., Groveville, N. J., has appointed the following western agents: McGee Sales Agency, 75 Fremont St., San Francisco, Calif.; Flickinger, Meyers and Rudolph, 129 West Second St., Los Angeles, Calif., and the Manufacturers Sales Service Co., P. O. Box 655, Salt Lake City, Utah. W. A. Ramsay of Honolulu was appointed representative for Hawaii.

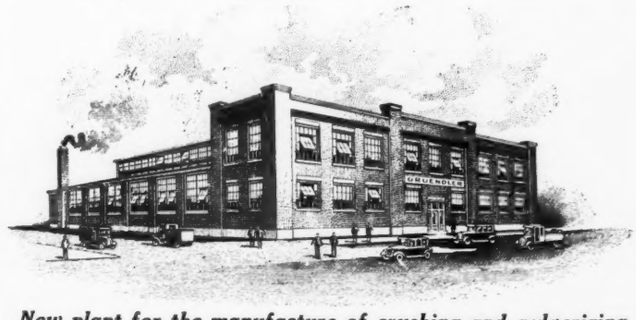
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio, announce the following new appointments in connection with its dealer sales organization: Lombard Iron Works, Augusta, Ga.; Murray Co., Dallas, Texas, and adjacent territory; D. de Treville, Savannah, Ga.; J. G. Iler, Charlotte, N. C.; Cameron and Barkley, Charleston, S. C., and Wm. G. Moorman, Buffalo, N. Y.

Lakewood Engineering Co., Cleveland, Ohio, according to a recent report, will be merged with the Jaeger Machine Co. of Columbus, Ohio, when plans already approved by directors of the two companies are adopted by their stockholders. It is planned to continue the sales and distribution departments of each company, although a close co-operation between these departments will be maintained.

Parsons Thompson Engineering Co., Cleveland, Ohio, has been incorporated in Ohio as a sales and engineering organization for the Metal Equipment Co. of Cleveland, manufacturers of dust arrestors. The directors and officers of the new engineering company are as follows: S. S. Parsons, president (assistant secretary-treasurer of the Metal Equipment Co.); L. Thompson, vice-president; Robert Wisely, vice-president; Geo. Walzer, treasurer (president of Metal Equipment Co.); Peter Reed, secretary, and Clarence Scott, assistant secretary-treasurer (secretary of Metal Equipment Co.).

Caterpillar Tractor Co., San Leandro, Calif., according to announcement of R. C. Force, president of the company, has concluded negotiations with the Russell Grader Mfg. Co. of Minneapolis, Minn., whereby it has acquired the business and facilities of the latter company. The Russell line of road building machines will henceforth be manufactured by the road machinery division of Caterpillar Tractor Co. at the plant formerly occupied by the Russell company at Minneapolis. The Caterpillar company has also announced its intention to build an eastern combined harvester factory at Peoria, Ill., where its principal tractor plant is now located.

Cincinnati Car Corp., Cincinnati, Ohio, manufacturers of freight and passenger rolling equipment for city and interurban electric railway service, is now marketing a complete line of industrial locomotives in gasoline, gasoline-electric, Diesel, electric trolley and storage battery types. These locomotives will be furnished in a variety of sizes from small 2- and 3-ton units up to 50-ton, or larger, and in various track gages. H. R. Sykes will be in charge of sales and service of the locomotive division. Two of the company's line of gasoline-powered locomotives will be exhibited at the coming show of the American Road Builders' Association.



New plant for the manufacture of crushing and pulverizing equipment